SHAFTS AND WINDING AT MINES - CONSULTATIVE DOCUMENT

EXPLANATORY NOTE

CONTENTS

1. The document upon which formal consultations are being held comprises:

   (a) draft Regulations;

   (b) a draft Approved Code of Practice.

The proposals differ from those currently in force in that they are framed to cover all classes of mine. The same general principles for safe shafts and winding equipment and practices will apply in all cases, with the means of compliance being detailed in the Code of Practice.

APPLICATION

2. The proposals, if they come into effect, will supersede and repeal those parts of the Mines and Quarries Act 1954 which deal with shafts and winding and revoke major segments of the Coal and other Mines (Shafts, Outlets and Roads) Regulations 1960 and the Miscellaneous Mines (General) Regulations 1956. Consequential amendments to other mining legislation will also be required, (see the Schedule to the draft Regulations). The framework of duties, offences and liabilities provided in the Mines and Quarries Act 1954 will apply at mines in relation to all parts of the proposed Regulations as it does at present in relation to existing legislation.

3. It is intended that this package on Shafts and Winding, together with two other packages on Underground Transport and Underground Access and Egress, will cover all matters of travel and movement to, from and in underground parts of a mine and repeal or revoke all existing legislation on such matters. Formal consultations are also being held on the Underground Access and Egress package and it is hoped to commence informal consultation on the Underground Transport package towards the end of the year.

COST-BENEFIT ASSESSMENT

4. The proposal should not impose significant extra costs on those who are currently conducting their undertakings in accordance with good practice or who have implemented or are implementing the recommendations of the Safe Manriding in Mines Reports. Some capital expenditure on improved or additional shaft and winding equipment may be necessary at a few mines but it is believed that this is reasonably practicable to achieve if phased over a number of years.

5. The introduction and implementation of the new Regulations and Approved Code of Practice will produce minor one-off administration and training costs for the mining organisations.

6. The provision of up-to-date regulations and practical guidance should assist in enhancing good working practice and safety awareness in the industry and provide a framework for the deployment of safe, modern technology. The revocation or repeal of existing, out of date statute will remove a constraint on technological development and remove the need for local regulations made by Parliament and exemptions issued by the HSE, thus releasing industry's, HSE's and Parliament's resources to more beneficial usage.

7. Overall, the ongoing direct and indirect savings and benefits produced by the application of the Shafts and Winding in Mines package should more than cover the one-off costs occasioned by it.

IMPLEMENTATION

8. The target date for the Regulations and Approved Code of Practice to be implemented is 1986.

Draft Mines (Shafts and Winding) Regulations 198

Draft proposals for Regulations to be made under section 15(1), (2), (3)(a) and (5)(b) of and paragraph 1(1)(c), (2), 6(1), 7, 16 and 21(b) and (c) of Schedule 3 to the Health and Safety at Work etc. Act 1974.

Arrangement of Regulations

1. Citation and commencement.
2. Interpretation.
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6. Means of travelling through shafts.
7. Transport of materials and minerals through shafts.
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Citation and commencement

1. These Regulations may be cited as the Mines (Shafts and Winding) Regulations 198- and shall come into operation on -

Interpretation

2.- (1) In these Regulations, unless the context otherwise requires -

"manager" means the manager for the time being of a mine and any reference to "the mine" shall be construed as a reference to the mine of which he is the manager;

"shaft" includes a raise, staple-pit, winze or any similar excavation whether sunk or in the course of being sunk and any staple bunker under construction, and so much of any superstructure provided at the top of a shaft as forms an extension to the shaft shall be deemed to form part of the shaft.

(2) Expressions to which meanings are assigned by the Mines and Quarries Act 1954(a) or the Health and Safety at Work etc. Act 1974(b) shall, unless the context otherwise requires, have the same meanings in these Regulations and in any document issued under these Regulations.

Application

3. These Regulations shall apply to all mines except that only Regulation 5(8) shall apply to abandoned mines.

Shaft sinkings

4.- (1) So far as is reasonably practicable, all operations at a mine carried out in connection with the sinking of a shaft shall be planned and carried out so as to prevent danger.

(a) 1954 c.70 amended by SI 1974/2013, SI 1975/1102

(b) 1974 c.37

(2) The Manager shall appoint in writing a sufficient number of competent persons to supervise the sinking of a shaft at the mine.

Precautions in shafts

5.- (1) Every shaft through which persons travel in the ordinary course of their work shall be designed, constructed and used and every fixture in a shaft shall be installed and used so as to prevent danger of injury to persons so far as is reasonably practicable.

(2) The manager shall make rules to ensure the regular and adequate examination and maintenance of every such shaft and its fixtures.

(3) An inspector may, by notice served on the manager, require the modification or improvement of any rule made pursuant to paragraph (2) above.

(4) The manager shall appoint in writing a sufficient number of competent persons who shall at regular intervals examine and maintain every such shaft and its fixtures.

(5) The results of any examinations made pursuant to paragraphs (2) or (4) above shall be recorded and kept in a safe place.

(6) As far as is necessary to prevent danger, every person in a shaft who is not inside a conveyance the gates of which are closed shall wear and use a safety harness, and the manager shall ensure that there is a sufficient supply of such harnesses, and enough anchorages in the shaft or on a conveyance to ensure safety.

(7) Every entrance to a shaft shall have a suitable barrier.

(8) If it is necessary for any person to enter a shaft not normally used by persons in the course of their work, the manager of the mine (or where there is no statutory duty to appoint a manager, that persons employer) shall ensure that he does so in a safe manner, and that it is safe for him to do so.

Means of travelling through shafts

6.- Every shaft provided for persons to travel through shall be equipped with means enabling them to do so safely.

Transport of materials and minerals through shafts

7.- Whenever materials or minerals are carried through a shaft, precautions shall be taken to ensure that persons are not thereby endangered.

Winding apparatus

8.- (1) All winding apparatus and equipment ancillary thereto shall be installed and used so as to prevent danger, so far as is reasonably practicable, and shall be suitable for the use to which it is put.

(2) Without prejudice to the generality of the preceding paragraph, all winding apparatus shall be provided with effective:-

(a) brakes and brake locks;

(b) interlocking devices;

(c) means of controlling power to the winding engine;

(d) means of preventing an overwind;

(e) means of preventing a conveyance or counterweight travelling at an excessive speed;

(f) means of safely stopping and holding a conveyance or counterweight in the event of an overwind; and

(g) means of monitoring the movement of every conveyance in the shaft.

Construction and use of conveyances

9.- (1) All conveyances used in a shaft shall be suitable for the use to which they are put.

(2) In the event of any person travelling through a shaft on a counterweight, suitable safety equipment shall be provided and used.

Ropes

10.- The manager shall ensure that all ropes used in a shaft, and all apparatus (including any detaching hook) provided for attaching a conveyance, counterweight or platform to a rope are suitable for the purpose to which they are put.

Signalling and communication

11.- (1) Every shaft equipped with winding apparatus shall be provided with -

(a) a means of giving both audible and visual signals; and

(b) a means of speech communication,

and all such means as are specified in sub paragraphs (a) and (b) above shall be so placed as to ensure the safety of persons in the shaft.

(2) Only persons appointed in writing by the manager for the purpose shall use any signalling equipment provided pursuant to this Regulation, other than means of speech communication.

Operation of winding apparatus

12.- (1) Whenever persons are below ground the manager shall ensure that sufficient competent persons appointed in writing by him for the purpose are available at the mine to ensure the safe operation of winding apparatus.

(2) The manager shall give each competent person written instructions of his duties and specify in writing the maximum hours of work of winding enginemen.

(3) The manager shall make rules to regulate the operation of any winding apparatus.

(4) Rules made pursuant to paragraph (3) of this Regulation shall specify the manner in which and the conditions under which each such winding apparatus is to be used to ensure the safe operation of the apparatus and equipment ancillary to it.

(5) An Inspector may, by notice served on the manager, require the modification of any rule made pursuant to paragraph (3) of this Regulation.

Commissioning of winding apparatus

13.- (1) The manager shall appoint in writing a sufficient number of competent persons who shall examine all aspects of the installation and operation of any winding engine and ancillary apparatus which is to be put into use in any shaft in the mine.

(2) Any person appointed pursuant to paragraph (1) of this Regulation shall

(a) in the course of making any examination pursuant to that paragraph, ascertain, whether that winding engine and ancillary apparatus are likely to cause danger to any person in the mine; and

(b) after making such an examination make a report thereof.

(3) Other than for the purposes of an examination made pursuant to paragraph (1) of this Regulation, the manager shall not permit any winding engine and ancillary apparatus to be brought into use in the mine for the first time until he is satisfied that no danger to any person is likely to be caused by such bringing into use.

Maintenance of winding apparatus

14.- (1) All winding apparatus at a mine, and all equipment ancillary to the winding apparatus shall be regularly and systematically inspected, tested and maintained in accordance with rules made by the manager for the purpose.

(2) The manager shall appoint in writing a sufficient number of competent persons to ensure the regular and systematic inspection, testing and maintenance of all winding apparatus at the mine and all equipment ancillary to it.

(3) An Inspector may, by notice served on the manager, require the modification of any rule made pursuant to paragraph (1) of this Regulation.

Exemption certificates

15.- (1) Subject to paragraph (2) of this Regulation, the Executive may, by a certificate in writing, grant an exemption from any requirement or prohibition imposed by these Regulations, and any such exemption may be granted subject to conditions and to a limit of time and may be revoked at any time.

(2) The Executive shall not grant any such exemption unless, having regard to the circumstances of the case, and in particular to -

(a) the conditions, if any, which it proposed to attach to the exemption; and

(b) any other requirements imposed by or under any enactment which apply to the case,

it is satisfied that the health and safety of persons who are likely to be affected by the exemption will not be prejudiced in consequence of it.

Repeals and modifications of the 1954 Act

16.- (1) The provisions of the 1954 Act specified in column 1 of Schedule 1 to these Regulations and hereby repealed to the extent set out opposite thereto in column 2 of that Schedule.

(2) Sections 30(1) and 42 of the 1954 Act shall cease to have effect in relation to shafts.

Revocation and modification of Regulations

17.- (1) The Regulations specified in Column 1 of Part 1 of Schedule 2 to these Regulations are hereby revoked to the extent set out opposite thereto in Column 2 of that Part of the Schedule.

(2) The Regulations specified in Part 2 of Schedule 2 to these Regulations shall cease to have effect in relation to shafts.

(3) The Regulations specified in Part 3 of Schedule 2 to these Regulations (being Regulations which apply to particular mines) are hereby revoked.

SCHEDULE 1 Regulation 16(1)

REPEALS OF THE PROVISIONS OF THE MINES AND QUARRIES ACT 1954

1 Provision	2 Extent of Repeal
Section 28	In sub-section (1) the words - (a) "shaft and"; (b) "the top of the shaft and the entrances therefrom to the workings and between those entrances themselves or, as the case may be, for carrying persons between"; (c) "shaft or" In sub-section (2) the words - (a) "shaft and"; (b) "for carrying persons between the top of the shaft and the entrances therefrom to the workings and between those entrances themselves or, as the case may be"; (c) "shaft or"; (d) "in the case of a shaft, the distance between the top of the shaft and the bottom of the lowest provided for affording to persons access to the shaft and,"
Section 31	Subsections (1), (2), (4) and (5)
Section 43	The whole section
Section 45	Subsections (1)(a) and (3) (a)

SCHEDULE 2

PART I
REVOCATION OF REGULATIONS

1 Regulations	2 Extent of Revocation
The Miscellaneous Mines (General) Regulations 1956 S.I. 1956/1778.	Regulations 9, 10, 14, 15, 20 to 22, 41 to 43, 46, 69 and 79.
The Coal and Other Mines (Shafts, Outlets and Roads) Regulations 1960 S.I. 1960/69; amended by S.I. 1968/1037, 1978/1648.	Regulations 12(3), 14 to 16, 25 to 45, 71 to 79, 81, 82 and 84.
The Mines (Emergency Egress) Regulations 1973 S.I. 1973/194.	Regulations 5 and 6.

PART II

REGULATIONS CEASING TO HAVE EFFECT IN RELATION TO SHAFTS

1. Regulations 5, 7, 8, 11 to 13, 16 to 19, 38 to 40, 44, 45, 47 to 52, 74 and 76 to 80 of the Miscellaneous Mines (General) Regulations 1956.

2. Regulations 6 to 13, 17 to 24, 51 to 56, 65 to 70 and 83 of the Coal and Other Mines (Shafts, Outlets and Roads) Regulations 1960-

PART III

REVOCATION OF REGULATIONS APPLYING TO PARTICULAR MINES

REGULATIONS	REFERENCES
The Hem Heath Mine (No 2 Shaft) Special Regulations, 1957	SI 1957/2000
The Winn's Ironstone Mine (Temporary Shaft) Special Regulations, 1958	SI 1958/536
The Blackhall Mine (South Shaft) Special Regulations, 1958	SI 1958/550
The Prestonlinks Mine (Hydraulic Winding Apparatus) Special Regulations, 1961	SI 1961/1155
The Beckermet Mine (No 2 Shaft) Special Regulations, 1962	SI 1962/930
The Lady Windsor Mine (No 2 Upcast Shaft) Special Regulations, 1962	SI 1962/933
The Kiveton Park Mine (Harrycroft Shaft) (Winding and Haulage Apparatus) Special Regulations, 1962	SI 1962/1137
The Grimethorpe Mine (No 3 Shaft) Special Regulations, 1962	SI 1962/1238
The New Monckton 1, 2 and 6 Mine (No 1 Shaft) Special Regulations, 1962	SI 1962/1588
The Parkside Mine (Friction Winding) Special Regulations, 1963	SI 1963/865
The South Kirkby Mine (Friction Winding) Special Regulations, 1963	SI 1963/1036
The Weetslade Mine (Friction Winding) Special Regulations, 1963	SI 1963/1188
The Rising Sun Mine (Friction Winding) Special Regulations, 1963	SI 1963/1198
The Grimethorpe Mine (Friction Winding) Special Regulations, 1963	SI 1963/1218
The Bilston Glen Mine (Friction Winding) Special Regulations, 1963	SI 1963/1359
The Killoch Mine (Friction Winding) Special Regulations, 1963	SI 1963/1472
The Manor Powis Mine (Friction Winding) Special Regulations, 1963	SI 1963/1473
The Monktonhall Mine (Friction Winding) Special Regulations, 1963	SI 1963/1474
The Kames Mine (Friction Winding) Special Regulations, 1963	SI 1963/1517
The Cardowan Mine (Friction Winding) Special Regulations, 1963	SI 1963/1548
The Bedlay Mine (Friction Winding) Special Regulations, 1963	SI 1963/1566
The Douglas Mine (Friction Winding) Special Regulations, 1963	SI 1963/1567
The Woolley 'A' Mine (No 2 Downcast Shaft) Special Regulations, 1963	SI 1963/1650
The Hucknall Mine (No 5 Shaft) Special Regulations, 1963	SI 1963/1802
The Bold Mine (Friction Winding) Special Regulations, 1963	SI 1963/1915
The Mosley Common Mine (Friction Winding) Special Regulations, 1963	SI 1963/1963
The Agecroft Mine (Friction Winding) Special Regulations, 1963	SI 1963/1998
The New Monckton 1, 2 and 6 Mine (Friction Winding) Special Regulations, 1964	SI 1964/63

REGULATIONS	REFERENCES
The Bradford Mine (Friction Winding) Special Regulations, 1964	SI 1964/322
The Houghton Main Mine (Friction Winding) Special Regulations, 1964	SI 1964/609
The Kingsbury Mine (No 1 Shaft) Special Regulations, 1964	SI 1964/610
The Askern Main Mine (Friction Winding) Special Regulations, 1964	SI 1964/773
The Langwith Mine (No 1 Downcast Shaft) Special Regulations, 1964	SI 1964/804
The Whitwell Mine (No 1 Shaft) Special Regulations, 1964	SI 1964/829
The Ashington Mine (New Moor Shaft) Special Regulations, 1964	SI 1964/1057
The Astley Green Mine (Friction Winding) Special Regulations, 1964	SI 1964/1105
The Cowdenbeath No 7 and Cowdenbeath No 10 (Kirkford) Mine Special Regulations, 1964	SI 1964/1165
The Kinneil Mine (Friction Winding) Special Regulations, 1964	SI 1964/1543
The Bestwood Mine (No 2 Shaft) Special Regulations, 1964	SI 1964/1546
The Lady Victoria Mine (Lady Victoria Shaft) Special Regulations, 1964	SI 1964/1613
The Murton Mine (West Upcast Shaft) (Friction Winding) Special Regulations, 1964	SI 1964/1698
The Hem Heath Mine (Friction Winding) Special Regulations, 1964	SI 1964/1772
The Florence Mine (Friction Winding) Special Regulations, 1964	SI 1964/1789
The Wolstanton Mine (Friction Winding) Special Regulations, 1964	SI 1964/1790
The Littleton Mine (No 3 Downcast Shaft) Special Regulations, 1964	SI 1964/1799
The Fryston Mine (Friction Winding) Special Regulations, 1964	SI 1964/2021
The Gartshore No 3 and 12 Mine Special Regulations, 1965	SI 1965/12
The Kellingley Mine (Friction Winding) Special Regulations, 1965	SI 1965/13
The Clipstone Mine (Friction Winding) Special Regulations, 1965	SI 1965/90
The Rossington Main Mine (Friction Winding) Special Regulations, 1965	SI 1965/121
The Maltby Main Mine (Friction Winding) Special Regulations, 1965	SI 1965/181
The Seafield Mine (Friction Winding) Special Regulations, 1965	SI 1965/182
The Frickley Mine (No 1 Shaft) Special Regulations, 1965	SI 1965/241
The Snowdon Mine (Friction Winding) Special Regulations, 1965	SI 1965/616
The Car House Mine (Car House Shaft) Special Regulations, 1965	SI 1965/908
The Dearne Side Mine (Dearne Side Shaft) Special Regulations, 1965	SI 1965/909
The Flockton Lane End Mine (New Hards Shaft) Special Regulations, 1965	SI 1965/910
The Hemingfield Mine (Drawing Shaft) Special Regulations, 1965	SI 1965/911
The Hemingfield Mine (Water Shaft) Special Regulations, 1965	SI 1965/912
The Higham Mine (Higham Pumping Shaft) Special Regulations, 1965	SI 1965/913

REGULATIONS	REFERENCES
The Low Stubbin Mine (Low Stubbin Shaft) Special Regulations, 1965	SI 1965/914
The Nunnery Mine (Upcast Pit Shaft) Special Regulations, 1965	SI 1965/915
The Nunnery Mine (West Pit Shaft) Special Regulations, 1965	SI 1965/916
The Rotherham Main Mine (No 2 Shaft) Special Regulations, 1965	SI 1965/917
The Waleswood Mine (Downcast Shaft) Special Regulations, 1965	SI 1965/918
The Woolley Barnsley Mine (Woolley Barnsley Shaft) Special Regulations, 1965	SI 1965/919
The Brodsworth Main Mine (Friction Winding) Special Regulations, 1965	SI 1965/974
The Tilmanstone Mine (Friction Winding) Special Regulations, 1965	SI 1965/1195
The Hickleton Main Mine (Friction Winding) Special Regulations, 1965	SI 1965/1549
The Markham Main Mine (No 1 Shaft) Special Regulations, 1965	SI 1965/1583
The Bevercotes Mine (Friction Winding) Special Regulations, 1965	SI 1965/1694
The Brookhouse Mine (Downcast Shaft) Special Regulations, 1965	SI 1965/1708
The Treeton Mine (Downcast Shaft) Special Regulations, 1965	SI 1965/1710
The Sharlston Mine (No 1 Upcast Shaft) Special Regulations, 1965	SI 1965/1759
The Wearmouth Mine (Friction Winding) Special Regulations, 1965	SI 1965/1160
The Westoe Mine (Friction Winding) Special Regulations, 1965	SI 1965/1761
The Frickley Mine (Friction Winding) Special Regulations, 1965	SI 1965/1834
The South Crofty Mine (Robinson's Shaft and Cook's Shaft) Special Regulations, 1965	SI 1965/1914
The Weetslade Mine (No 2 Shaft) Special Regulations, 1966	SI 1966/49
The Winsford Rock Salt Mine (No 4 Shaft) Special Regulations, 1966	SI 1966/117
The Ryhope Mine (Friction Winding) Special Regulations, 1966	SI 1966/235
The Warsop Main Mine (Friction Winding) Special Regulations, 1966	SI 1966/290
The Manton Mine (Friction Winding) Special Regulations, 1966	SI 1966/298
The Linby Mine (No 1 Shaft) Special Regulations, 1966	SI 1966/474
The Santon Ironstone Mine (Santon Shaft) Special Regulations, 1966	SI 1966/570
The Dinnington Main Mine (Winding and Haulage Apparatus) Special Regulations, 1966	SI 1966/573
The Shirebrook Mine (Friction Winding) Special Regulations, 1966	SI 1966/580
The Randolph Mine (No 2 Shaft) Special Regulations, 1966	SI 1966/659
The Orgreave Mine (Downcast Shaft) Special Regulations, 1966	SI 1966/731
The Harrington No 10 Mine (No 9 Upcast Shaft) Special Regulations, 1966	SI 1966/988
The Winsford Rock Salt Mine (Winding) Special Regulations, 1966	SI 1966/1207

REGULATIONS	REFERENCES
The Ackton Hall Mine (Silkstone Shaft) Special Regulations, 1967	SI 1967/630
The Barony Mine (No 3 and No 4 Shafts) Special Regulations, 1967	SI 1967/909
The Horden Mine (South Shaft) Special Regulations, 1967	SI 1967/1235
The Orgreave Mine (Upcast Shaft) Special Regulations, 1967	SI 1967/1357
The Orgreave Mine (Downcast Shaft) (Automatic Shaft Signalling) Special Regulations, 1968	SI 1968/707
The Brookhouse Mine (Downcast Shaft) (Automatic Shaft Signalling) Special Regulations, 1968	SI 1968/713
The Sherwood Mine (No 1 Shaft) Special Regulations, 1968	SI 1968/714
The Silksworth Mine (Winding) Special Regulations, 1968	SI 1968/1023
The Houghton Mine (Winding) Special Regulations, 1968	SI 1968/1261
The Hawthorne Mine (Winding) Special Regulations, 1968	SI 1968/1673
The Michael Mine (No 2 and No 3 Shafts) Special Regulations, 1968	SI 1968/1738
The Grimethorpe Mine (Friction Winding) (Amendment) Special Regulations, 1968	SI 1968/1757
The Lochhead Mine (Downcast Shaft) Special Regulations, 1968	SI 1968/1831
The Sutton Manor Mine (No 1 Shaft) Special Regulations, 1969	SI 1969/274
The Newmarket Silkstone Mine (Bye Pit) Special Regulations, 1969	SI 1969/285
The Seafield Mine (Friction Winding) (Amendment) Special Regulations, 1969	SI 1969/1029
The Camborne Mine (No 1 Shaft) Special Regulations, 1969	SI 1969/1030
The Bentley Mine (No 2 Shaft) Special Regulations, 1969	SI 1969/1055
The Hatfield/Thorne Mine (No 1 Shaft) Special Regulations, 1969	SI 1969/1181
The Brodsworth Mine (Friction Winding) (Amendment) Special Regulations, 1969	SI 1969/1246
The Bedlay Mine (Friction Winding) (Amendment) Special Regulations, 1969	SI 1969/1635
The Lynemouth Mine (No 4 Shaft Crane Winding) Special Regulations, 1969	SI 1969/1772
The Park Hill Mine (Oakenshaw Shaft) (Winding and Haulage Apparatus) Special Regulations, 1970	SI 1970/21
The Abernant Mine (Friction Winding) Special Regulations, 1970	SI 1970/180
The Bilsthorpe Mine (No 1 Shaft) Special Regulations, 1970	SI 1970/190
The Bedwas Mine (North Upcast Shaft) Special Regulations, 1970	SI 1970/164
The Netherton Mine (Nos 2 and 3 Shafts) Special Regulations, 1970	SI 1970/836
The Cynheidre Mine (Friction Winding) Special Regulations, 1970	SI 1970/1041
The Treeton Mine (Downcast Shaft) (Automatic Shaft Signalling) Special Regulations, 1970	SI 1970/1204

REGULATIONS	REFERENCES
The Cynheidre Mine (Friction Winding No 2) Special Regulations, 1970	SI 1970/1512
The Monktonhall Mine (Friction Winding) (Amendment) Special Regulations, 1970	SI 1970/1549
The Dawdon Mine (Friction Winding) Special Regulations, 1971	SI 1971/81
The Whittle Mine (Upcast Shaft) Special Regulations, 1971	SI 1971/318
The Coventry Mine (No 1 Shaft) Special Regulations, 1971	SI 1971/319
The Wyndham/Western Mine (Friction Winding) Special Regulations, 1971	SI 1971/866
The Frickley/South Elmsall Mine (No 3 Shaft) Special Regulations, 1971	SI 1971/1789
The Kimblesworth Mine (Downcast Shaft) Special Regulations, 1971	SI 1971/1840
The Boulby Mine (Sea Water Intake and Tailings Disposal Shaft) Special Regulations, 1972	SI 1972/490
The South Kirkby Mine (Friction Winding) (Amendment) Special Regulations, 1972	SI 1972/925
The Westoe Mine (Winding) Special Regulations, 1972	SI 1972/1568
The Wearmouth Mine (Winding) Special Regulations, 1972	SI 1972/1569
The Wheal Jane Mine (Clemows Shaft) Special Regulations, 1972	SI 1972/1908
The Creswell Mine (No 1 Shaft) Special Regulations, 1972	SI 1972/1953
The Geevor Mine (Victory Shaft) Special Regulations, 1973	SI 1973/128
The Groverake Mine (No 2 Shaft) Special Regulations, 1973	SI 1973/1002
The Sherwood Mine (No 2 Shaft) Special Regulations, 1973	SI 1973/1634
The Celynen North Mine, Graig Fawr (Downcast Shaft) Special Regulations, 1973	SI 1973/1938
The Boulby Mine (Single Shaft Development) Special Regulations, 1973	SI 1973/1966
The Eccles Mine (Fenwick Downcast Shaft) Special Regulations, 1974	SI 1974/803
The Cwm/Coedely Mine (Coedely No 2 (Upcast) Shaft) Special Regulations, 1974	SI 1974/928
The Ellistown Mine (Lower Part on No 1 Shaft) Special Regulations, 1974	SI 1974/1390
The Vane Tempest Mine (Winding) Special Regulations, 1974	SI 1974/1762
The Polmaise 3/4 Mine (No 4 Shaft) (Shaft Signalling) Special Regulations, 1974	SI 1974/1815
The Cwm/Coedely Mine (Cwm No 2 (Upcast) Shaft) Special Regulations, 1974	SI 1974/1865
The Wheal Jane Mine (Clemows Shaft) Special Regulations, 1974	SI 1974/1932 SI 1974/2209
The Comrie Mine (No 1 Shaft) Special Regulations, 1974	SI 1974/2210

REGULATIONS	REFERENCES
The Westoe Mine (St Hilda Shaft) Regulations, 1975	SI 1975/1395
The Polmaise 3/4 Mine (Nos 3 and 5 Shafts) Regulations, 1975	SI 1975/1079
The Haig Mine (Thwaites Shaft) Regulations, 1975	SI 1975/1519
The Dinnington Main Mine (No 1 Shaft) Regulations, 1975	SI 1975/2053
The Gedling Mine (No 1 Downcast Shaft) Regulations, 1976	SI 1976/156
The Thurcroft Main Mine (No 1 Shaft) Regulations, 1976	SI 1976/1014
The Brynlliw Mine (No 2 Upcast Shaft) Regulations, 1976	SI 1976/1611
The Daw Mill Mine (No 1 Downcast Shaft) Regulations, 1976	SI 1976/1732
The Bolsover Mine (No 2 Shaft) Regulations, 1976	SI 1976/1735
The Comrie Mine (No 1 Shaft) (Automatic Shaft Signalling) Regulations, 1976	SI 1976/2045
The Birch Coppice (No 3 (Wood End) Shaft) Regulations, 1976	SI 1976/2047
The Welbeck Mine (Winding) Regulations, 1976	SI 1976/2049
The Blidworth Mine (Winding) Regulations, 1976	SI 1976/2050
The Winsford Rock Salt Mine (No 3 Shaft) Regulations, 1976	SI 1976/2075
The Markham Mine (Shafts) Regulations, 1976	SI 1976/2087
The Yorkshire Main Mine (Well Shaft) Regulations, 1977	SI 1977/226
The Baddesley Mine (Nos 1 and 2 Upcast Shafts) Regulations, 1977	SI 1977/736
The Ollerton Mine (No 1 Shaft) Regulations, 1977	SI 1977/738
The Silverhill Mine (No 1 Downcast Shaft) Regulations, 1977	SI 1977/1045
The Daw Mill Mine (No 2 Upcast Shaft) Regulations, 1977	SI 1977/1196
The Mount Wellington Mine (Winding) Regulations, 1977	SI 1977/1384
The Hatfield/Thorne Mine (No 2 Shaft) Regulations, 1977	SI 1977/1475
The Welbeck Mine (Nos 1 and 2 Shafts) Regulations, 1977	SI 1977/1549
The Silverhill Mine (Nos 1 and 2 Shafts) Regulations, 1977	SI 1977/1636
The East Hetton Mine (Hutton Shaft) Regulations, 1977	SI 1977/1661
The Ellington Mine (No 3 Shaft) Regulations, 1979	SI 1979/67
The Hucknall Mine (No 5 Shaft) Regulations, 1979	SI 1979/288
The Easington Mine (North Shaft) Regulations, 1979	SI 1979/585
The Rufford Mine (No 1 Shaft) Regulations, 1979	SI 1979/983
The Yorkshire Main Mine (Friction Winding) Regulations, 1979	SI 1979/1491
The Murton Mine (Friction Winding) Regulations, 1980	SI 1980/68
The Ollerton Mine (Nos 1 and 2 Shafts) Regulations, 1980	SI 1980/260

REGULATIONS	REFERENCES
The Markham Mine (No 1 Shaft) Regulations, 1980	SI 1980/261
The Bilsthorp Mine (No 1 Shaft) Regulations, 1980	SI 1980/262
The Wistow Mine (No 2 Shaft) (Winding) Regulations, 1981	SI 1981/1615
The Pye Hill Mine (Winding) Regulations, 1981	SI 1981/1616
The Holditch Mine (No 2 Shaft) (Winding) Regulations, 1982	SI 1982/43
The Rufford and Cotgrave Mine (Friction Winding) Regulations, 1983	SI 1983/170
The Wistow Mine (No 1 Shaft) (Friction Winding) Regulations, 1983	SI 1983/226
The Conditions for Automatic Winding in Specified Shafts in Mines Regulations, 1983	SI 1983/583
The Boulby Mine (Nos 1 and 2 Shafts) Regulations, 1983	SI 1983/715
The Manwinding Without Keps (Specified Shafts in Mines) Regulations, 1983	SI 1983/1547
The Stillingfleet Mine (No 1 Shaft) (Winding) Regulations, 1983	SI 1983/1676
The Stillingfleet Mine (No 2 Shaft) (Friction Winding) Regulations, 1983	SI 1983/1677
The Riccall Mine (No 1 Shaft) (Winding) Regulations, 1983	SI 1983/1678

SHAFTS AND WINDING IN MINES

Draft Approved Code of Practice on the (Shafts and Winding
in Mines) Regulations 198 to be approved under Section 16
of the Health and Safety at Work etc. Act 1974

Introduction

1. The Mines (Shafts and Winding) Regulations set out the aims to be achieved in order to prevent danger from operating in shafts and must be complied with. They apply to shafts and winding at all mines and replace or modify the statutory provisions listed in Schedules 1 and 2 of the Regulations. The date of implementation is [ ] 1986 (see also para 8)

2. Methods of meeting the requirements set out in the Regulations are given in the associated Approved Code of Practice "Shafts and Winding in Mines". Compliance may be achieved by adopting an alternative method but in this case it should be demonstrable that the approach adopted provides no less a level of safety (see also paras 6 and 7 below). This is intended to leave those who have the primary duties of complying with the Regulations free to meet the requirements of any individual Regulation by following the Approved Code or by selecting another suitable method which has been developed as a result of technical progress.

3. The Regulations and Code are intended to operate within the framework of duties and liabilities provided by the Mines and Quarries Act 1954(1) and the Health and Safety at Work etc Act 1974(2). The Code refers to various classes of persons who should carry out or should be instructed to carry out various actions. Under mining statute, persons employed at a mine are required to obey directions and instructions given to them, and rules issued, by those on whom duties are laid. Section 7 of the HSW Act requires all employees to take reasonable care and to cooperate with those on whom duties are laid by these and other regulations.

4. In addition to the specific shafts and winding matters dealt with in the Regulations and Approved Code, S.2 of the HSW Act places general duties on employers for their employees, e.g. to provide, so far as is reasonably

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(1) Subsequently referred to in this document as the M & Q Act
(2) Subsequently referred to in this document as the HSW Act

practicable, a safe system of work and information, training and supervision necessary to safety. Section 6 of the HSW Act puts general duties on those who design, manufacture, import or supply articles for use at work. The general duties apply to mine shafts and winding equipment in addition to the more specific duties created by these Regulations and thus must also be fulfilled.

5. The Approved Code is divided up into sections, each of which deals with a particular Regulation. Where a section of the Code gives guidance on compliance with duties arising under another Regulation or under statutory provisions outside these Regulations, a reference to the relevant statutory provision is made in the margin.

6. The Approved Code is not intended to provide comprehensive guidance to safety in shafts. It aims to deal with the most important safety areas in shafts and winding but it cannot specify every possible detail or circumstance. Managers should remain alert to developments and hazards that may not be fully dealt with in the Code or other guidance material. Where a Manager is proposing to depart from a procedure in the Code, he is advised to consult with the Mines and Quarries Inspector in charge of the District.

7. Equipment required by virtue of Regulations which are absolute must be provided from the date the Regulations come into effect. However, it may not always be immediately practical to meet every other requirement. In such cases, where the regulation imposes a duty "so far as is reasonably practicable", all reasonably practicable steps should be taken to introduce the appropriate practices and equipment by the earliest achievable date.

8. The Safe Manriding in Mines Reports(1) and subsequent amendments issued by the HSE make recommendations agreed by the industry on safety in shafts and detail good practice. The recommendations are referred to as appropriate in the Code and, where referred to, constitute part of the Code. Reference is also made to these Reports and to British and International Standards in footnotes to the Code. However, the references in footnotes do not themselves constitute part of the Approved Code and do not have statutory force.

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(1) Subsequently referred to in this document as "SMIM".

9. Five Guidance Notes are appended to the Code. Appendices 2 and 3 are specified in the body of the Code and thus constitute part of it, the remainder are not specifically referred to in this way and thus do not have statutory force but provide necessary or useful background material to the Code.

APPROVED CODE OF PRACTICE

"SHAFTS AND WINDING IN MINES"

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Notice of Approval

Practical Guidance

(Sections are numbered according to the Regulation upon which they give guidance; there are no sections 1, 2, 3, 15, 16 and 17 as practical guidance is not appropriate to these Regulations.

Section

4. Shaft sinkings.
5. Precautions in shafts.
6. Means of travelling through shafts.
7. Transport of materials and minerals through shafts.
8. Winding apparatus.
9. Construction and use of conveyances.
10. Ropes.
11. Signalling and communications.
12. Operation of winding apparatus.
13. Commissioning of winding apparatus.
14. Maintenance of winding apparatus.

Appendices to the Code of Practice

Appendix 1	Guidance Notes on Types of steel to be used for conveyance suspension gear.
Appendix 2	Formula to determine the maximum retardation which should not cause the winding rope to slip in a friction winding system.
Appendix 3	Formula to determine the factor of safety for friction winding ropes.
Appendix 4	Components of conveyance suspension gear which do not require periodic heat treatment.
Appendix 5	Guidance Notes on terms used in the Regulations and Code of Practice.

NOTICE OF APPROVAL
OF THE CODE OF PRACTICE
ON SHAFTS AND WINDING
IN MINES BY THE HEALTH
AND SAFETY COMMISSION

By virtue of Section 16(1) of the Health and Safety at Work etc. Act 1974 and with the consent of the Secretary of State for Employment the Health and Safety Commission has on approved the Code of Practice entitled "Shafts and Winding in Mines".

The Code of Practice gives practical guidance with respect to The Mines (Shafts and Winding) Regulations 198 (SI 198 No.) and to Section 2 of the Health and Safety at Work Etc. Act 1974.

The Code of Practice comes into effect on 198 which is the date when the Regulations come into operation.

Signed

Secretary to the Health and Safety Commission

SECTION 4 - SHAFT SINKING

"REG 4.- (1) SO FAR AS IS REASONABLY PRACTICABLE, ALL OPERATIONS AT A MINE CARRIED OUT IN CONNECTION WITH THE SINKING OF A SHAFT SHALL BE PLANNED AND CARRIED OUT SO AS TO PREVENT DANGER"

(2) THE MANAGER SHALL APPOINT IN WRITING A SUFFICIENT NUMBER OF COMPETENT PERSONS TO SUPERVISE THE SINKING OF A SHAFT AT THE MINE.

4.1 Where relevant the guidance given in other parts of this Code should be adhered to in shaft sinking operations; this section gives additional guidance relevant to the particular circumstances in sinking new shafts, staple shafts and bunkers, or deepening of existing shafts. In planning the design and REG 5 construction of new shafts or the deepening of existing shafts the manager/owner should take into account the nature of the strata through which the shaft will be sunk and the type of operations the shaft will be used for. Unless the nature of the strata makes it unnecessary, the shaft should be lined.

4.2 Before commencing any shaft sinking, the manager/owner should arrange the working methods and safety precautions so as to minimise the risks to the health and safety of those employed. The competent persons appointed by the manager to supervise shaft sinking work should include eg: the master sinker, foremen sinkers and chargemen.

Protection against persons falling

4.3 To prevent accidents due to falls, scaffolds used in shaft sinkings should be provided with safety rails and attachment points for safety harnesses. Scaffolds should not be moved except under the direction of a competent person appointed to supervise the sinking. When stationary, scaffolds should be wedged or secured to the shaft wall as necessary to prevent danger. Scaffolds and their suspension gear should be inspected by competent persons at least once in every 24 hours and included in the rules of maintenance for the mine. REG 14

Protection against falling objects

4.4 There is particular danger to persons from falling objects in shaft sinking because the workings are unfinished and persons are working at different levels. In addition to the precautions outlined in paragraph 5.3 the manager should ensure that:-

(a) doors are provided at the top of the shaft or deepening, except during the initial period of the sinking, which are capable of closing off the shaft, the doors should be kept clear and not opened except when free of debris;

(b) scaffolds are kept clear of unnecessary loose material and debris; and

(c) where walling or tubbing is being carried out, it is inspected by a competent person at least once in each working shift, and that the person carrying out the inspection makes a written report of it(1) not later than the end of his shift.

Winding

4.5 Because of the nature of the operations some deviation from normal winding practice (as outlined in paragraphs 8.1 to 8.36) may be unavoidable and precautions should be taken to ensure that danger does not arise as a result. The following paragraphs set some of these precautions out.

4.6 In the case of scaffold winches, interlocks should be provided to ensure that a clutch cannot be withdrawn until the associated brake is fully applied. Similarly it should not be possible to release the brake unless the clutch is fully engaged. When any clutch is withdrawn it should be possible only to raise the rope(s) on the other drums and scaffolds should be levelled by upward movement. The retarding effect of reduction gearing should not be taken into account when designing the winch brakes. Scaffold ropes should not be used for a period exceeding 3½ years unless the manager has satisfied himself that it is safe to do so (see para 10.5). The static factor of safety of the scaffold rope should not be less than 5. Scaffold ropes should be recapped at least every 12 months. The main load carrying members of the scaffold structure should have a factor of safety in tension of at least 7 based on the ultimate tensile strength of the steel.

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(1) M & Q Form 275

4.7 During shaft sinking it is not usually practical to provide guide ropes for the conveyance throughout the length of the shaft. Where it is not practical to provide guides the manager's rules required under Regulation 12 (3) should, as far as is reasonably practicable, ensure that persons are not exposed to danger as a result of movement of the conveyance and in particular should:-

(a) limit the depth of a shaft sinking to 90 metres before guides are installed;

(b) limit the depth of shaft to be excavated below the sinking scaffold which should be kept as close to the bottom of the sinking as is consistent with safety in order to minimise the distance the conveyance has to travel without guides; and

(c) ensure that any winding rope is of a non-rotating type.

4.8 The movement of the conveyance should be controlled so as to minimise the danger of collision with the sinking scaffold. The automatic contrivance should be regularly adjusted to ensure that the speed of the conveyance cannot exceed 2.0 metres per second when it is at the same level as the scaffold or lower.

4.9 Where detaching hooks are not used, two ultimate overwind switches should be provided in the headframe for each conveyance, connected to tensioned trip wires or similar devices operated by the rider. The overwind clearance above the ultimate overwind switch should be sufficient to allow the winding engine to be brought safely to rest under any loading condition with only 50% of the mechanical braking applied. Crash doors should be situated immediately below each conveyance when it is in the ultimate overwind position and all crash doors should close automatically without damaging the winding ropes whenever any conveyance reaches that position.

4.10 In the written instructions required by Regulation 12(2), the manager should instruct any person appointed to transmit signals under Regulation 11(2) to ensure that anything which is to be carried through the shaft in a conveyance is properly loaded and in particular that:-

(a) the conveyance is correctly attached to the winding rope;

(b) no minerals project above the rim;

(c) tools, equipment and other materials for use in the mine are not carried together with minerals and where they project above the rim of the conveyance are secured;

(d) nothing capable of causing injury is adhering to the outside of the conveyance; and

(e) when the conveyance is to be raised it is first allowed to hang free and then steadied.

When anything is to be raised or lowered otherwise than in a conveyance the appointed person transmitting signals or some other competent person should ensure that it is safely slung.

4.11 Interlocking should be provided so that:

(a) when winding is taking place, tipping chutes are proved clear of the path of the conveyance;

(b) during winding, the shaft top doors are proved open whenever a conveyance is in a zone extending from a safe stopping distance (about 8 metres) below the doors until it is above the doors; and

(c) before discharging conveyances into the tipping chutes, all shaft top doors are proved closed.

The banksman should not allow persons to enter or leave a conveyance or to load materials into or out of a conveyance unless the shaft top doors have been closed and the conveyance lowered onto them. The interlock system should allow the conveyance to be raised off the doors and the doors opened before the conveyance is wound down the shaft.

4.12 When anything is being lowered through a shaft sinking, the competent person operating the winding apparatus should stop the load about 6 metres above the point to which it is being lowered and should not lower it further until he has received a signal telling him that it is safe to continue winding. Similarly when raising anything through the shaft he should stop it about one metre above the point from which it is being raised and should not raise it further until he has received a signal to continue winding.

4.13 During the initial stages of sinking, before the sinking scaffold is in place, cranes may be used to transport men, minerals and materials through the shaft. The use of cranes should not continue longer than is necessary to allow the normal winding apparatus to be installed, and cranes should not be used to wind from depths exceeding 50 metres.

4.14 Where cranes are used for winding, their stability should be maintained at all times and kept secure on a level foundation adjacent to the shaft. Adequate visibility should be maintained at all times for the driver. Cranes should be fitted with an automatic safe working load indicator and a table indicating the safe working load at varying inclinations of the jib or radii of the load. The safe working load should be set at not more than 80% of the normal rating of the crane. The safe working load indicator should give an audible and visual warning when the load being raised or lowered approaches the safe working load. The device should cut off the power to the motors and apply the hoist drum brakes if the safe working load is exceeded by 10% or more, and should also be designed to fail to safety.

4.15 Every crane should be fitted with brakes which can stop and hold the load stationary at any point in the shaft. Consideration should be given to providing such brakes on the hoist drum. Brakes should be capable of exerting a braking torque at least 25% greater than the torque applied to the drum by the safe working load. Crane brakes should be automatically applied when the appropriate control lever or switch is not held in the operating position and whenever the motive power is cut off.

4.16 Cranes should be provided with effective devices which automatically cut off the motive power and apply the brakes in the event of:-

(a) the speed of the crane hoist exceeding by more than 15% the maximum speed to be specified by the manager;

(b) movement of the jib beyond the normal limits of the derrick motion; or

(c) overwinding of any load.

4.17 Cranes should be provided with a lock which will prevent the jib of the crane moving in the horizontal plane and the lock should be effective whenever a load is being raised or lowered through the shaft sinking.

Egress

4.18 Where ladders are provided in a sinking shaft, there should be suitable provision for all persons in the shaft to quickly reach a place of safety; alternatively, emergency winding apparatus capable of carrying the persons in the shaft to safety should be kept readily available for use. It may be necessary to provide more than one means of leaving the shaft. For instance, where there is the risk of inrush from water bearing strata, several ladders to an interim place of safety, e.g. the sinking scaffold should be provided; generally speaking scaffolds particularly of the multi-deck variety, are unsuitable as emergency means of winding.

SECTION 5 - PRECAUTIONS IN SHAFTS

"REG 5.- (1) EVERY SHAFT THROUGH WHICH PERSONS TRAVEL IN THE ORDINARY COURSE OF THEIR WORK SHALL BE DESIGNED, CONSTRUCTED AND USED AND EVERY FIXTURE IN A SHAFT SHALL BE INSTALLED AND USED SO AS TO PREVENT DANGER OF INJURY TO PERSONS SO FAR AS IS REASONABLY PRACTICABLE.

(2) THE MANAGER SHALL MAKE RULES TO ENSURE THE REGULAR AND ADEQUATE EXAMINATION AND MAINTENANCE OF EVERY SUCH SHAFT AND ITS FIXTURES

(3) AN INSPECTOR MAY, BY NOTICE SERVED ON THE MANAGER, REQUIRE THE MODIFICATION OR IMPROVEMENT OF ANY RULE MADE PURSUANT TO PARAGRAPH (2) ABOVE.

(4) THE MANAGER SHALL APPOINT IN WRITING A SUFFICIENT NUMBER OF COMPETENT PERSONS WHO SHALL AT REGULAR INTERVALS EXAMINE AND MAINTAIN EVERY SUCH SHAFT AND ITS FIXTURES.

(5) THE RESULTS OF ANY EXAMINATION MADE PURSUANT TO PARAGRAPHS (2) OR (4) ABOVE SHALL BE RECORDED AND KEPT IN A SAFE PLACE.

(6) AS FAR AS IS NECESSARY TO PREVENT DANGER EVERY PERSON IN A SHAFT WHO IS NOT INSIDE A CONVEYANCE THE GATES OF WHICH ARE CLOSED SHALL WEAR AND USE A SAFETY HARNESS, AND THE MANAGER SHALL ENSURE THAT THERE IS A SUFFICIENT SUPPLY OF SUCH HARNESSES AND ENOUGH ANCHORAGES IN THE SHAFT OR ON A CONVEYANCE TO ENSURE SAFETY.

(7) EVERY ENTRANCE TO A SHAFT SHALL HAVE A SUITABLE BARRIER.

(8) IF IT IS NECESSARY FOR ANY PERSON TO ENTER A SHAFT NOT NORMALLY USED BY PERSONS IN THE COURSE OF THEIR WORK, THE MANAGER OF THE MINE (OR WHERE THERE IS NO STATUTORY DUTY TO APPOINT A MANAGER, THAT PERSONS EMPLOYER) SHALL ENSURE THAT HE DOES SO IN A SAFE MANNER, AND THAT IT IS SAFE FOR HIM TO DO SO".

Precautions in Shafts

5.1 Shaft sumps and extensions of the shaft above the surface landing should be provided with suitable means of access to enable apparatus and fixtures in them to be inspected or examined and adequate lighting should be provided. Suitable means should be provided where necessary for the removal of spillage.

5.2 Pipes and cables should be securely installed with adequate clearances from moving conveyances and counterweights. They should be positioned to avoid danger; eg methane drainage pipes and electric cables should not be installed adjacent to each other or opposite the open ends of conveyances. Provision should be made as necessary to earth pipe ranges to prevent the build-up of static electricity(1).

Protection from falling objects

5.3 No person should go into or across the uncovered space at the bottom of the shaft except for the purpose of working there; the manager should ensure that, except during shaft sinking, no person works in any uncovered space at the bottom of a shaft when the winding apparatus is in motion or when anything is suspended from the winding apparatus except for the purpose of maintenance operations or the handling of bulky equipment or material. Other measures taken by the manager should include:-

(a) ensuring that banksmen and onsetters or other persons appointed by the manager, keep landings and insets clear of loose materials and minerals;

(b) ensuring that any working platforms etc are provided with toeboards to prevent tools etc from falling off them;

(c) providing hand tools with wrist straps; and

(d) providing canopies and covered walkways at landings or insets where persons may be at risk.

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(1) See BS 5958

Maintenance of Shafts

5.4 The manager's rules, which should be revised as frequently as necessary, should detail arrangements for the inspection of the lining of the shaft and of the foundations and structures associated with the shaft and any pipes or cables installed in it.

5.5 The manager should appoint, in writing, the following:-

(a) a competent person(s) (ie the mine mechanical engineer or a person of similar competence) to be responsible for the maintenance of shafts and associated structures as laid down in the manager's rules; and

(b) shaftsmen or other competent persons to carry out routine inspection as required by the manager's rules.

The manager's rules should also lay down that the competent person appointed under (a) above should carry out periodic additional examinations accompanied where necessary by other qualified staff (eg a civil engineer).

5.6 The rules should specify the frequency and type of inspections or examinations to be carried out. Routine inspections of the shaft lining and furnishings should be carried out at intervals not greater than 7 days unless persons do not usually travel through that part of the shaft. In that case inspections may be carried out at longer intervals not exceeding 6 months, provided that in these circumstances the shaft is inspected immediately before persons travel through it, unless it has been inspected within the previous 7 days, or is needed for emergency escape purposes.

5.7 Persons responsible for carrying out inspections or examinations should be given written instructions of the inspections or examinations to be carried out and their frequency(1).

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(1) Detailed guidance on the maintenance of shaft linings, and foundations, buildings and structures associated with shafts are contained in Part 2B sections 15, 16 and 23 of SMIM.

Reports of inspections or examinations

5.8 Immediately after any inspection or examination required under these Regulations, the person carrying it out should make a written report(1) identifying any defects requiring remedial work. Defects likely to affect the safety of the shaft should be brought immediately to the attention of the manager. The reporting system should enable the progressive deterioration of structures to be identified by comparison with previous reports so that repairs can be effected before danger arises.

Protection against injury from falls and moving equipment

5.9 Shaft-side barriers and gates should be designed and constructed so as to prevent persons and things from falling into the shaft or coming into contact with working parts of the winding apparatus(2). Except when loading and unloading, shaft gates should be kept closed. If any part of a shaftside barrier is removable, the banksman or onsetter should ensure that it is kept in place at all times except as necessary for the use of the shaft or for inspection or maintenance.

Safety Harnesses

5.10 Persons working in shafts must wear a safety-harness at all times where it is necessary to prevent danger and ensure that the harness is secured to a suitable anchorage point and should only detach it to move to a new working position. All conveyances, counterweights and working platforms must be provided with sufficient anchorage points to enable persons to reach any part of the shaft on which it is necessary to work whilst making use of their safety harness.

5.11 The manager must make arrangements for the issue, storage, inspection and maintenance of safety harnesses(3).

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(1) M&Q Form 275.

(2) See BS 5304/1975 Clause 10 and Part 2A paras 144 and 148 of SMIM.

(3) See BS 1397 and part 2B section 15 of SMIM.

The use of simple safety belts in shafts is not adequate and safety harnesses for use in shafts should comprise full body harness(1).

Precautions in disused Shafts

5.12 When it is proposed to enter disused shafts, the manager or employer should draw up rules to ensure that the work is carried out safely although it is recognized that in an emergency time may not permit this to be done. In this case the work should be supervised by a competent person appointed by the manager or employer.

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(1) Type D harness in BS 1397.

SECTION 6 - MEANS OF TRAVELLING THROUGH SHAFTS

"REG 6.- EVERY SHAFT PROVIDED FOR PERSONS TO TRAVEL THROUGH SHALL BE EQUIPPED WITH MEANS ENABLING THEM TO DO SO SAFELY."

6.1 Wherever practical, shafts should be provided with mechanically operated winding apparatus which is suitable for manriding. Where this is not practical, the requirements of the regulation must be met by other means; for example in very shallow shafts (normally those less than 50 metres deep) or in shafts which are only used as an emergency means of egress, ladders or preferably stairways may be provided. In such cases consideration should be given to the provision of permanent lighting in the shaft. Cranes should not be used for winding in shafts below a depth of approximately 50 metres.

6.2 All ladders installed in shafts, whether as the sole means of travelling through it or as a supplement to winding apparatus, should be properly constructed, securely fastened and provided with platforms at intervals which, in the case of new installations, should not exceed 5 metres. These platforms should be securely fenced and constructed so as to form a safe means of rest and allow reasonably convenient access for carriage of an injured person on a stretcher. Unless secure handholds are provided, ladders should project at least 1 metre above any platform. Ladders should be provided with suitable fencing which will prevent persons falling further than the distance between adjacent platforms and offer protection from falling objects. If space permits, ladders should be inclined at an angle to the vertical. This angle should be not more than 15 degrees.

Egress from overwound conveyances

6.3 Platforms and stairways or ladders should be provided to allow persons in an overwound conveyance which has been detached from the rope or held by the catches referred to in 8.28 to reach a place of safety. Suitable provisions should be made where necessary in shaft sumps.

SECTION 7 - TRANSPORT OF MATERIALS AND MINERALS THROUGH SHAFTS

"REG 7.- WHENEVER MATERIALS OR MINERALS ARE CARRIED THROUGH A SHAFT, PRECAUTIONS SHALL BE TAKEN TO ENSURE THAT PERSONS ARE NOT THEREBY ENDANGERED".

7.1 In order that persons are not endangered, the manager should make arrangements to ensure that persons do not enter the shaft when materials (but not fluids) or minerals are being transported except in the following circumstances:-

(a) in an adequately protected ladderway; (see para 6.2);

(b) during shaft sinking;

(c) during maintenance work in the shaft when it may be necessary for persons to take maintenance equipment and materials with them.

(d) when transporting bulky materials which cannot be raised or lowered inside a conveyance - in such circumstances the load may project above the top of the conveyance or be slung beneath it and it may be necessary for someone to travel on the conveyance to ensure that the load does not foul the shaft or its fixtures; and

(e) when fluids, minerals or materials are being transported through a pipeline in the shaft.

Persons travelling through the shaft in a conveyance should be permitted to take with them such items as portable technical equipment or personal tool kits which are necessary for their work.

7.2 Where minerals are transported through a pipeline means of halting the flow of minerals through the shaft should be provided. These means should be clearly marked and readily accessible.

SECTION 8 - WINDING APPARATUS

"REG 8.- (1) ALL WINDING APPARATUS AND EQUIPMENT ANCILLARY THERETO SHALL BE INSTALLED AND USED SO AS TO PREVENT DANGER, SO FAR AS IS REASONABLY PRACTICABLE, AND SHALL BE SUITABLE FOR THE USE TO WHICH IT IS PUT.

(2) WITHOUT PREJUDICE TO THE GENERALITY OF THE PRECEDING PARAGRAPH, ALL WINDING APPARATUS SHALL BE PROVIDED WITH EFFECTIVE:-

(A) BRAKES AND BRAKE LOCKS;

(B) INTERLOCKING DEVICES;

(C) MEANS OF CONTROLLING POWER TO THE WINDING APPARATUS;

(D) MEANS OF PREVENTING AN OVERWIND;

(E) MEANS OF PREVENTING A CONVEYANCE OR COUNTERWEIGHT TRAVELLING AT AN EXCESSIVE SPEED;

(F) MEANS OF SAFELY STOPPING AND HOLDING A CONVEYANCE OR COUNTERWEIGHT IN THE EVENT OF AN OVERWIND; AND

(G) MEANS OF MONITORING THE MOVEMENT OF EVERY CONVEYANCE IN THE SHAFT."

Design and Construction of Winding Apparatus

8.1 In designing winding apparatus for use in shafts, the following principles should be applied:-

(a) The safe operation of winding engines should not so far as is reasonably practicable depend on single line components but where their use is unavoidable they should be designed so as to avoid danger, for example by failing to safety; and

(b) Facilities should be incorporated into the winding apparatus to enable routine maintenance tests to be carried out effectively.

Installation of winding apparatus

8.2 All winding engines should be firmly anchored to secure and level foundations and suitably housed. Except at a shaft sinking, winding engines should be housed separately from other machinery, preferably each in its own engine house.

Fire precautions

8.3 Winding engine houses should be constructed to minimise the risk of fire. The manager should ensure that adequate precautions are taken to prevent, detect and supress a fire breaking out in the engine house.

Hydraulic System Protection

8.4 Except in the case of the automatic operation of pumps in an accumulator system, brake system pumps or compressors should be prevented from starting when the brake lever is not in the fully applied position. Where brakes are operated by hydrostatic power, fluid thermal and level protection systems should be fitted. Where liquid controllers are operated by an hydraulic servo, unit fluid thermal protection should be fitted. The protective devices should:

(a) give an alarm when the operating parameters are exceeded; and

(b) after completion of the wind, prevent further winding and stop the hydraulic pumps.

Mechanical Brakes

8.5 Each winding engine should be fitted with mechanical brakes which act directly on the drum or sheave of the winding apparatus and which are capable of bringing the apparatus safely to rest at all times. Where the power supply is used for braking purposes, the mechanical brake should be automatically applied when the power supply is cut off. Where the mechanical brakes are applied wholly or partially by fluid, steam or air pressure, they should be backed up by a means of automatic application independent of such pressure. Brake systems should be fitted with pressure gauges to enable the braking force to be checked.

8.6 The performance of winding engine mechanical brakes should be adequate for both service and emergency duties and meet the following requirements:-

(a) drum winding apparatus with two conveyances or a conveyance and counterweight - the brakes should be capable of holding the drum stationary when the loads are balanced and the maximum torque is applied in either direction by the winding engine.

(b) drum winding apparatus with one conveyance - the brakes should be capable of holding the drum stationary when the fully loaded conveyance is halfway down the shaft and the maximum downwards torque is applied by the engine.

(c) clutched drum winding apparatus - the brakes when the drum(s) are clutched should be capable of holding the drum(s) stationary when the loads are balanced and the maximum torque is applied in either direction by the winding engine. In the declutched condition the brakes should be capable of exerting a braking torque not less than that defined in SMIM Part 1B section 32 para 20. If manriding is to take place with a drum declutched, the drum used for manriding should be provided with two brakes or one disc with two braking surfaces which, when the drum is declutched, are capable of exerting a braking torque not less than that defined in (b) above for a drum winder with one conveyance.

(d) friction winding apparatus manually applied brakes - the brakes should be capable of holding the driving sheave stationary when a torque is applied to it of 2.5 times the maximum static torque which will occur during the winding of men, materials or minerals. The winding engineman should be able to vary the braking torque up to the maximum required.

(e) friction winding apparatus emergency or automatically applied brakes - the brakes should be capable of producing a braking torque which will reduce the speed of the ropes on the winding sheave by at least:-

(i) 1 metre per second^2 when persons are being carried; or

(ii) 0.5 metre per second^2 when materials or minerals are being carried.

Emergency brakes should produce a braking torque, when the sheave has been brought to rest, of not less than that specified in sub paragraph (e) above. The maximum permissible retardation under emergency trip conditions should not exceed that produced by the greatest torque which will not cause slip between the winding ropes and drum calculated on the basis of a coefficient of friction between them of 0.2. The maximum retardation which should not cause the winding rope to slip should be determined from the formula in Appendix 2.

8.7 In drum winding systems to minimise the risk of injury to persons when the brake is applied following an emergency trip, the retardation of the conveyance should not exceed 1g. To achieve this the maximum retardation at the drum or sheave should not exceed 5m/sec^2.

8.8 The mechanical braking system should be able to bring the winding apparatus safely to rest and apply at least 50% of the normal braking force in the event of a failure or malfunction of any one component of the system. The brakes should be automatically applied following any failure of operating fluid pressure in the system. Newly manufactured mechanical brakes should not contain any single line components.

8.9 Existing mechanical brakes should wherever practical be modified to eliminate single line components. If this cannot be achieved any such components should be designed and manufactured for infinite fatigue life, and their operational life should be specified.

8.10 Serious reduction of braking force can occur as a result of contamination of brake paths or linings by moisture or oil(1) and steps should be taken to prevent this.

Retention of electrical braking

8.11 Dynamic braking should be provided for all AC winding engines, except those in back-shafts, and wherever practical it should be designed to operate automatically in the event of an emergency trip. With DC winding engines, power retained for electrical braking is also available for driving and consequently automatically applied electical braking should only be provided following an emergency trip if the circuitry is designed to prevent driving torque being applied. In the case of newly manufactured AC or DC winding engines, electrical braking should be so designed that in the event of an emergency trip it is automatically applied until the retardation from the mechanical brakes is proved to be sufficient to bring the system safely to rest. Where electrical braking is retained after the application of the mechanical brakes, consideration should be given to the combined effect of the mechanical and electrical brakes to avoid producing an unacceptably high rate of retardation.

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(1) See part 1B Section 29 para 10 and Part 2A Para 215 of SMIM.

Steam and Compressed Air Winding Engines

8.12 With most of these winding engines, reversal of steam or compressed air may be used to replace or augment the mechanical brake during service braking; however it is not practical to retain steam or air for automatic application of reverse power following an emergency trip. The practice is to cut off the steam or air supply in the event of an emergency trip and automatically disconnect the throttle control linkage. Special release valves should be provided to exhaust the steam or compressed air between the throttle valve and cylinders to ensure complete removal of power.

Brake locking

8.13 All winding apparatus should be provided with an effective means of locking the mechanical brakes in position when they are fully engaged. This device should be set to operate automatically and should be designed to fail to safety.

8.14 At each manwinding level, except at underground levels in a shaft sinking, there should be automatic indicators clearly visible to persons entering or leaving the conveyances which show if the brakes are fully engaged and locked in that position.

8.15 Each winding level, except underground levels in a shaft sinking, should be provided with a brake lock actuating device which enables persons working on a conveyance or counterweight to ensure that it cannot be moved inadvertently.

Interlocking of the brake lock

8.16 During manwinding, the brake locking device should be interlocked with the shaftside equipment to prevent the winding apparatus from being set in motion if:-

(a) any shaft side barrier or gate is not fully closed;

(b) any keps, platforms or shaftside equipment protrude into the path of a conveyance; or

(c) any emergency stop button has not been reset after an emergency stop signal.

Stop switch

8.17 All electrically driven winding apparatus should be provided with a switch, placed within easy reach of the person operating the winding engine, which will:-

(a) cut off the supply of electricity to the engine other than for the purpose of braking it; and

(b) automatically apply the mechanical brakes.

Power control system safety

8.18 In addition to the normal overload, overwind and overspeed protection, the features listed in Part 2A Para 52 of SMIM should be incorporated into the design of new winding engines and where practical into existing winding engines.

Safety circuits

8.19 Safety circuits should not rely upon single line components for functions essential to safety and should be protected against electrical faults. Detailed guidance on the design features required for safety circuits is contained in Part 1A para 47, and Part 2A para 44 of SMIM(1).

Prevention of overwinding and overspeed

8.20 All winding apparatus should have a device which prevents the conveyance or counterweight from travelling beyond a pre-determined position above the highest landing in the shaft. Winding apparatus with a designed normal winding speed in excess of 1.5 metres/sec should be fitted with a permanently engaged automatic contrivance which when persons are being carried causes the mechanical brake to be applied to:

(a) prevent a conveyance from being landed at the bottom of the shaft or at its lowest entrance at a speed greater than:-

  (i) 1.5 metre/sec for drumwinding engines; or

  (ii) 4 metres/sec for friction winding engines or such a lower speed as is necessary to prevent the conveyances or counterweight engaging the arrestors;

(b) limit the speed of an ascending conveyance so as to avoid danger to any person travelling therein.

Winding engines with clutched drums should have a separate drive from each drum to the appropriate dial on the automatic contrivance or an automatic contrivance for each drum. Simple overspeed devices which trip at a single speed are only suitable for engines with a designed normal winding speed of not more than 1.5 metres/sec; in these cases the overspeed switch should be set as close to this speed as possible without causing unnecessary trips. Guidance on the design of automatic contrivances can be found in Part 1A para 42 and Part 2A para 33 of SMIM(2).

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(1) See also Part 1A Paras 43-46, Part 1B Sections 17, 18, 19 and 20, Part 2A Paras 42 and 43 and part 2B Section 6 of SMIM.

(2) See also Part 1A paras 36-41, Part 1B Section 13-16, Part 2A paras 31, 32 and 34-37 and Part 2B Sections 3 and 4 of SMIM.

8.21 If the automatic contrivance has separate modes for manwinding and mineral winding it should be set to the manwinding mode before persons are allowed to enter the conveyances and indicators clearly visible to persons entering or leaving the conveyances should be provided at every landing showing if the contrivance is in the manwinding mode.

8.22 All winding apparatus should be fitted with suitable ultimate overwind switches in the headgear to safeguard against failure of the primary overwind protection. When operated by the conveyance or counterweight these should remove power from the winding engine and apply the mechanical brake. Detailed guidance on the design and construction of ultimate overwind switches can be found in Part 1A para 65 of SMIM(1).

Overwind protection for drum winding systems

8.23 When manwinding, although not necessarily when shaftsinking or using a hoppit or temporary conveyance for the purpose of examining or repairing a shaft or equipment installed in it, an effective device should be provided for detaching the conveyance from the winding rope to prevent it from being drawn against the headgear structure in the event of an overwind.

8.24 Danger to persons in a descending conveyance following an overwind should be prevented by providing suitable arresting devices below the lowest winding level or setting the emergency trip position to allow sufficient braking distance below it, or providing sufficient overtravel distance below the normal landing.

8.25 Arresting devices should be capable of safely arresting a fully man-loaded descending conveyance with an empty ascending conveyance at an impact speed of not less than 1.5m/sec or the speed resulting from an overspeed trip with braking force reduced by 50%, whichever is the greater. The peak rate of retardation should not exceed 2.5g ignoring any transient peaks of less than 0.04 seconds duration.

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(1) See also Part 1A paras 62-64 and Part 1B Section 23 of SMIM.

Overwind protection for friction winding systems

8.26 Friction winding apparatus should be provided with a combination of arrestors and bumping beams both in the headgear and the sump. Arrestors should be designed to retard the conveyance at an average rate of 1g.

8.27 In new installations with two conveyances, sump bumping beams should be located so that they are struck after those in the head gear. Where a conveyance and counterweight system is operated, the bumping beams for a descending counterweight should be in advance of those in the headgear.

Headgear catches

8.28 All winding apparatus, except in shaft sinkings, should be provided with catches or equivalent devices in the headgear to prevent an overwound and detached conveyance or counterweight from falling back an excessive distance (ie one likely to cause danger).

Slack rope protection

8.29 Except during shaft sinking at every shaft where drum winding apparatus is in use and men are being wound, devices should be provided to detect the formation of slack rope at the surface and cause the safety circuit to be tripped and audible and visual warning to be given to the winding engineman. Suitable methods of slack rope protection are discussed in Part 1A para 82 of SMIM(1).

Balance rope loop protection

8.30 To avoid risk of damage to the balance rope and shaft fittings, where applicable a monitoring device should be installed to detect when the loop lifts above its highest normal running position. Suitable methods of monitoring the movement of balance rope loops are discussed in Part 2A para 137 of SMIM(2).

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(1) See also Part 1A paras 74-81 and Part 1B Section 26 of SMIM.

(2) See also Part 2A paras 133-136 of SMIM.

Conveyance monitoring devices

8.31 All winding apparatus should be provided with the following devices visible to the winding engineman:-

(a) a rope speed indicator marked with the normal maximum speed and the maximum speed permissible for manwinding; and

(b) an indicator showing the position of each conveyance.

A mark on the rope or drum is not by itself an effective means of monitoring the position of the conveyance. Methods of monitoring the conveyance are dealt with in Part 1A para 99 of SMIM(1).

Guides

8.32 Shafts should be fitted with guides for the conveyances and counterweights(2).

8.33 When new, rope guides should have a factor of safety of at least five. Weight rods when new should have a minimum factor of safety of 10, and, for threaded portions under tension 15. Rope guides and weight rods should not normally be used for longer than 20 years.

Keps

8.34 Keps must not be used with friction winding systems and must not be fitted when new drum winding systems are installed. Where keps are already installed they should be removed where practical. Where for the time being, keps are retained for mineral/materials winding or clutching operations, they must not be used for manriding. The safety of men entering a conveyance should be ensured by the interlocking of the winding engine brake and the shaft gates as described in paragraph 8.16 and keps should be locked clear of the shaft. Automatic "keps clear" indicators should be provided at each landing, clearly visible to persons entering or leaving the conveyance.

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(1) See also Part 1A paras 95-98 and Part 2A paras 38-41 and Part 2B section 5.

(2) guidance on the design and maintenance of guide systems is contained in paras 109-124 of Part 2A of SMIM.

Shaftside equipment

8.35 Shaftside equipment should be interlocked to avoid its incorrect operation endangering persons(1).

8.36 Where minerals are carried in a skip measures should be taken:-

(a) to prevent loading unless an empty skip is in line; and

(b) to prevent a skip from being unloaded unless there is receiving capacity for its full load.

This should consist of direct manual supervision and control or, preferably, the provision of appropriate interlocks.

Automatic Winding of mineral

8.37 Winding apparatus which is capable of being operated automatically should comply with the provisions of the earlier paragraphs of this section and in addition should comply with Paras 8.38-40.

8.38 The means of converting the winding apparatus controls from manual to automatic operation should be situated at the winding engine manual control position. The apparatus should only be able to be converted to automatic operation when a conveyance (but not a counterweight) is at the highest landing to which it is normally raised.

8.39 The initiation of an automatic winding sequence should only be possible by means of manually operated controls. An effective means for preventing the winding apparatus from being set in motion or to stop it when it is in motion should be readily provided at these controls. The controls should be situated so that the person operating them can observe directly, or by means of television, the operation of the winding apparatus or the loading or unloading of a conveyance at the surface entrance or landing. Once the apparatus is set for automatic operation it should not be possible to set it in motion by any other means.

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(1) Guidance is given in Part 2A, paras 139-156 of SMIM.

8.40 Where the competent person is allowed to leave the winding engine room in accordance with rules made by the manager (see para 12.19) the following additional monitoring equipment should be provided:-

(a) thermal protection of all main bearings, winding engine brake paths and winder motor windings (and motor/generator sets where applicable);

(b) effective means of preventing or detecting moisture on the winding engine brake paths;

(c) vibration monitoring of high speed shafts and reduction gearing; and

(d) means of giving adequate warning of the outbreak of fire in the winding engine room.

Push Button Winding

8.41 Push button winding apparatus should comply with the provisions of the earlier paragraphs of this section of the code except 8.37-40. In addition it should comply with Paras 8.40-45.

8.42 Where winding of men is carried out the controls should be designed so that push button operation can only be initiated from a control station located at the shaft surface entrance or by means of the inching control, or, if a travelling onsetter is in attendance, from controls in the single conveyance.

8.43 The changeover between manual and push button operation should be secured to ensure safety by means of key operated selector switches at the engine house desk and at the surface entrance. It should not be possible to change the winding apparatus from manual control to push button control unless a conveyance (but not a counterweight) is at the highest landing to which it is normally raised. When the apparatus is set to push button control it should not be possible to set it in operation by any other means.

8.44 Except where a travelling onsetter is employed, push button winding systems should be provided either with;

(a) a means for the onsetter to signal to the banksman that he is ready to wind. This should be interlocked so as to prevent the winding apparatus from being set in motion unless the signal has been given; (where there is more than one underground landing in use "ready to wind" signals should be received from all onsetters to or from whose landing the conveyance will travel before the apparatus can move); or

(b) a conventional shaft signalling system (see guidance on regulations 11 and 12) with signals given in the normal way by both banksman and onsetter before the banksman sets the apparatus in motion. In this case the signalling equipment should be of high integrity and should be interlocked so as to prevent the apparatus being set in motion unless a correct sequence of signals is transmitted.

8.45 Inching can be carried out either from the banksman's or onsetter's positions and the controls should be located so that the person operating them can observe the movement of the conveyance. The controls should be designed so that inching cannot be initiated from either landing unless the banksman or onsetter has got acceptance from the other by means of a switch set to the station from which inching is carried out. Where a travelling onsetter is employed, the means for inching control should be within the conveyance.

Lifts used in mine shafts

8.46 Lift apparatus should comply with the provisions of the code except paras 8.13-16, 8.23, 8.28-31 and 8.33-45. In para 8.6 the reference to the coefficient of friction and to Appendix 2 do not apply. None of the references to SMIM apply.

8.47 Lifts should be suitably designed for use in a mine shaft(1) and should incorporate protection against the following:-

(a) inadvertent or uncontrolled movement of a conveyance;

(b) overspeed; and

(c) overtravel.

8.48 Brakes fitted to the lift drive should be designed to operate automatically:-

(a) whenever the conveyance is brought to rest; and

(b) if the supply of electricity to the lift apparatus is cut off.

8.49 Lift installations should be fitted with automatic devices which will bring the apparatus safely to rest if:

(a) the floor of the conveyance travels more than 0.6 metres above the highest landing or below the lowest landing; or

(b) a governor rope used to operate conveyance safety gear is severed.

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(1) Useful general guidance may be found in BS2655-1970 Specification for lifts, escalators, passenger conveyors and paternosters and BS5655 Pt 1 1979 - safety rules for the construction and installation of electric lifts.

SECTION 9 - CONSTRUCTION AND USE OF CONVEYANCES

"REG 9.- (1) ALL CONVEYANCES USED IN A SHAFT SHALL BE SUITABLE FOR THE USE TO WHICH THEY ARE PUT

(2) IN THE EVENT OF ANY PERSON TRAVELLING THROUGH A SHAFT ON A COUNTER-WEIGHT, SUITABLE SAFETY EQUIPMENT SHALL BE PROVIDED AND USED."

9.1 Every main suspension member of a conveyance should have a breaking strength of not less than 7 times the maximum static load which is normally carried by that member.

9.2 Conveyances which are intended to carry persons through a shaft, except for kibbles (see para. 9.4), should be completely covered in at the top,closed at the sides and provided with adequate floor(s) of sufficient strength to withstand any load likely to be imposed on it. They should be provided with gates or doors which cannot project beyond the side or end of the conveyance and provided with a secure handhold easily reached by all occupants. Additional means of egress through the roof and upper floor or side of each manwinding deck of the conveyance should be provided. If the exits from a conveyance are likely to be obstructed following an overwind, an alternative means of egress should be provided(1).

9.3 Conveyances used to transport vehicles should be provided with suitable means to retain the vehicles in place. Where practical, these means should be interlocked with the winding engine brakes in such a way that the apparatus cannot be set in motion unless the vehicles are correctly located and secured in place.

9.4 Kibbles of a type which are designed to be self tipping on the release of a locking mechanism should not be used for manwinding. Any kibble used for manwinding should have a minimum depth of at least one metre unless safety harnesses are used.

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(1) Additional guidance on the design and construction of conveyances is contained in Part 2A paragraphs 92-100 of SMIM.

9.5 Where winding apparatus comprises a conveyance and counterweight it is sometimes necessary for shaftsmen to travel on the counterweight for the purpose of inspecting the shaft. To ensure safety the counterweight should be provided with a suitable platform with handrails (see also para 5.10 on safety harnesses).

9.6 Persons being conveyed through a shaft, other than those engaged in inspection and maintenance should not travel other than in a purpose built and designed conveyance or on a counterweight in the cases described in Para 9.5 above. Exceptionally, if it is necessary for persons to accompany bulky materials that cannot be carried within a conveyance, measures should be taken to ensure that safety is not reduced.

SECTION 10 - ROPES AND SUSPENSION GEAR

"REG 10. THE MANAGER SHALL ENSURE THAT ALL ROPES USED IN A SHAFT, AND ALL APPARATUS (INCLUDING ANY DETACHING HOOK) PROVIDED FOR ATTACHING A CONVEYANCE, COUNTERWEIGHT OR PLATFORM TO A ROPE ARE SUITABLE FOR THE PURPOSE TO WHICH THEY ARE PUT."

10.1 In determining the suitability of any ropes, account should be taken of the maximum load to be carried and the ratio of the diameter of the drum or pulley to that of the rope to ensure that operational stresses are kept within safe limits. On no account should spliced ropes be used either as balance ropes or winding ropes, and ropes which have been used as balance ropes should not be used as winding ropes. Suspension ropes in lift installations should be rust resisting or galvanised.

10.2 The winding ropes on drum winding engines should be properly anchored and, to minimise the loading on the anchorage, at least two laps of rope should remain on the drum when the conveyance is at the deepest part of the shaft to which it may travel. Spare rope stored in or on the drum should not be considered as reducing the load on the anchorage.

Factors of Safety

10.3 In calculating the loads which winding and balance ropes should be capable of withstanding the manager should allow a factor of safety to take account of any abnormal stresses or fatigue to which the rope may be subjected. For winding and balance ropes the minimum acceptable factors of safety when first installed are in relation to the maximum static load to be carried in normal service:-

(a) for balance ropes on drum and friction winders, at least six times the weight of the rope;

(b) for winding ropes on drum winders, at least 6½ times the maximum static load or 5½ times the maximum static load where the Blair twin rope system is used;

(c) for winding ropes in lift installations, at least 12 times the maximum static load; and

(d) for winding ropes on friction winding apparatus:

(i) F_1 times the maximum static load they may be required to withstand when carrying persons; or

(ii) F_2 times the maximum static load they may be required to withstand when carrying the materials or minerals which are most frequently carried.

F_1 and F_2 are calculated by means of the formulae in Appendix 3.

In calculating factors of safety, winding ropes on scaffold winches should be treated as drum winding ropes.

10.4 Cappings of ropes should be able to withstand at least 7 times the maximum static load they will carry in service.

10.5 Ropes should be examined at regular intervals (see Paragraph 14.9) to assess their condition and any rope showing signs of significant deterioration should be taken out of service. In any event ropes should not be used in any winding apparatus for longer than:

(a) 3½ years as winding ropes in drum winders, except for Blair twin rope systems where the life should not exceed 2½ years;

(b) 2 years as winding ropes in friction winders;

(c) 5 years as winding ropes in lifts;

(d) 5 years as balance ropes in drum winders, including any period during which it was used for any other purpose; or

(e) 3 years as balance ropes in friction winders, including any period during which it was used for any other purpose.

Exceptionally, winding ropes on emergency mobile winding engines and at little used shafts may be used for longer periods, provided the manager has satisfied himself by testing etc, that the condition of the rope shows no significant deterioration and that safety is not thereby impaired. In no circumstances, must the life of a winding rope which has been used for mineral winding be extended.

Control of balance rope loops

10.6 Where balance ropes are used, the loop should be controlled(1).

Conveyance and counterweight suspension gear

10.7 The apparatus used to attach a winding or balance rope to a conveyance or counterweight should have a minimum factor of safety of 10:1 based on its ultimate breaking load when new and the maximum load which will normally be carried and have been shown by test to be capable of withstanding, without any permanent deformation, a proof load equal to 2½ times that maximum load. Where practical the use of screwed components in tension should be avoided but where they are utilised they should have a minimum factor of safety of 15:1. Suitable steels should be used(2). Where there are provided and used in rotation not less than three sets of apparatus in a shaft in which there are two conveyances, or not less than two sets of apparatus, in a shaft in which there is a single conveyance, that apparatus or parts thereof may be used for a maximum definitive life (calendar life from the date on which the apparatus is put into use for the first time) of twenty years, provided it is non-destructively tested following each period of six months use.

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(1) Suitable methods are described in Part 2B section 11 of SMIM.

(2) See Appendix 1.

SECTION 11 - SIGNALLING AND COMMUNICATIONS

"REG 11.- (1) EVERY SHAFT EQUIPPED WITH WINDING APPARATUS SHALL BE PROVIDED WITH -

(a) A MEANS OF GIVING BOTH AUDIBLE AND VISUAL SIGNALS; AND

(b) A MEANS OF SPEECH COMMUNICATION;

AND ALL SUCH MEANS AS ARE SPECIFIED IN SUB PARAGRAPHS (a) AND (b) ABOVE SHALL BE SO PLACED AS TO ENSURE THE SAFETY OF PERSONS IN THE SHAFT

(2) ONLY PERSONS APPOINTED IN WRITING BY THE MANAGER FOR THE PURPOSE SHALL USE ANY SIGNALLING EQUIPMENT PROVIDED PURSUANT TO THIS REGULATION, OTHER THAN MEANS OF SPEECH COMMUNICATION".

Shaft Signalling Equipment

11.1 Except in the case of lift installations, effective means of signalling should be provided from all entrances to the shaft to the winding engine room. Provision should also be made for shaftsmen to transmit signals effectively between the conveyance and the surface from all positions in the shaft and, where necessary, to allow persons involved in headgear and shaft sump maintenance to transmit signals to the winding engine man; where other systems are inadequate, radio inductive loop or equivalent systems should be used.

11.2 Signalling apparatus must give both audible and visual signals which should be displayed simultaneously at the shaft surface entrance, the winding engine room and those underground entrances normally used for manwinding in such a position that they can be easily seen by the banksman, winding engineman and travelling onsetter respectively. Signals in the winding engine room should be automatically cancelled on completion of the winding sequence by means of devices driven from the winding engine which are capable of distinguishing between stationary and creep speed conditions. The design of

The Elec- tricity Regs 198- shaft signalling equipment should where practical, comply with the guidance in Part 1A paragraph 90, Part 2A para 158-160 and part 2B section 13 of SMIM(1). Signalling systems in shafts where there is a danger of ignition of flammable gases must comply with the requirements of Regulation 22 of the Electricity Regulations.

Automatic signalling systems

11.3 Signalling systems designed to transmit signals automatically on completion of the loading and unloading processes should incorporate the following additional features:-

(a) automatic indicators clearly visible to the person operating the winding engine and at the banksman's position which show whether or not the unloading process has been completed at the surface landings;

(b) automatic indicators clearly visible to the person operating the winding engine and at the onsetter's position which show whether or not the loading process has been completed at the underground entrance; and

(c) a means for giving the banksman and onsetter audible and visual indication of every signal transmitted.

Provision of speech communication

11.4 Every shaft fitted with winding apparatus (other than lifts) should be provided with a means of speech communication between the winding engine man, banksman, onsetter and all other underground entrances. Speech communication should not be used to require movement of a winding engine except in an emergency, should always be available and should preferably be independent of the mine's telephone switchboard.

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(1) See also Part 1A paras 85-89, Part 1B sections 27 and 28, Part 2A para 157 and Part 2B section 13.

11.5 Where practical a means of speech communication should also be provided between the banksman and persons on any deck of a conveyance, for use in an emergency, or when persons are being carried to a landing where there is no onsetter. Similar facilities should be provided between a shaftsman riding on top of a conveyance or counterweight or persons involved in maintenance of headgear and shaft sump equipment and the banksman and winding engineman, although this should not be used as a substitute for transmitting the stipulated signals. Shaftsmens' communication and signalling systems should be designed to avoid common mode failure where possible and radio or inductive links could be used for this purpose.

11.6 Lift installations and push button winding systems employing travelling onsetters should be provided with a means of speech communication between the conveyance, every landing and a continuously manned point at the surface of the mine.

SECTION 12 - OPERATIONS

"REG 12.- (1) WHENEVER PERSONS ARE BELOW GROUND THE MANAGER SHALL ENSURE THAT SUFFICIENT COMPETENT PERSONS APPOINTED IN WRITING BY HIM FOR THE PURPOSE ARE AVAILABLE AT THE MINE TO ENSURE SAFE OPERATION OF WINDING APPARATUS.

(2) THE MANAGER SHALL GIVE EACH COMPETENT PERSON WRITTEN INSTRUCTIONS OF HIS DUTIES AND SPECIFY IN WRITING THE MAXIMUM HOURS OF WORK OF WINDING ENGINEMEN.

(3) THE MANAGER SHALL MAKE RULES TO REGULATE THE OPERATION OF ANY WINDING APPARATUS.

(4) RULES MADE PURSUANT TO PARAGRAPH (3) OF THIS REGULATION SHALL SPECIFY THE MANNER IN WHICH AND THE CONDITIONS UNDER WHICH EACH SUCH WINDING APPARATUS IS TO BE USED TO ENSURE THE SAFE OPERATION OF THE APPARATUS AND EQUIPMENT ANCILLARY TO IT.

(5) AN INSPECTOR MAY, BY NOTICE SERVED ON THE MANAGER, REQUIRE THE MODIFICATION OF ANY RULE MADE PURSUANT TO PARAGRAPH (3) OF THIS REGULATION.

S.2 Health & Safety at Work Act 1974

12.1 Guidance on the training of winding enginemen and winding testing engineers may be found in Part 1A para 130 of SMIM(1). No person shall be considered competent to be a winding engineman until they reach the age of 21 years.

Duties of banksmen and onsetters

12.2 Banksmen, onsetters and where appropriate, travelling onsetters responsibilities should include transmitting and acting on signals and over-seeing activities at which they are stationed, and excercising reasonable care that:-

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(1) See also Part 1A paras 127-129 and Part 1B section 33 of SMIM.

(a) whenever men are to be raised in a conveyance with more than one deck involving decking operations, the top deck is loaded first;

(b) the number of persons entering a conveyance or any deck of a conveyance does not exceed the maximum specified by the manager (see para 12.8(a)); and

(c) during manwinding, any automatic indicators required by paras 8.14 and 8.21 are correctly displayed.

Duties of winding enginemen

12.3 Except in the case of pushbutton/automatic winding or lifts (see paras 12.17-29) the winding apparatus should not be set in motion other than by the winding engineman or a trainee winding engineman working under the direct supervision of a winding engineman responsible for his training.

12.4 The specified duties of winding enginemen should require amongst other matters that:-

(a) except during automatic winding (or in some cases pushbutton winding - see para 12.18 & 23) the winding engineman should not leave the controls when the apparatus is in motion or when he has any cause to believe that anyone is in a conveyance, other than to close the main circuit breakers following an emergency trip;

(b) unless suitable alternative arrangements have been made by the manager the winding engineman must inspect the external parts of the apparatus within the winding engine house at least once in every shift, and keep it cleaned and lubricated;

(c) after any cessation of winding exceeding two hours the winding engineman should, before persons are carried through the shaft, test the apparatus by running the conveyance at least once from the surface of the shaft to the lowest entrance;

(d) if the winding engineman discovers any defect likely to affect the safe working of the winding system he should not set the apparatus in motion again until he has reported the defect to the manager or other official designated by the manager and that official has determined that it is safe to continue winding;

(e) when changing levels on a clutch drum winding engine the empty conveyance attached to the loose drum should normally be held at the surface by the loose drum brake while the fixed drum is turned to raise or lower the other empty conveyance; and

(f) unless the automatic contrivance and the fixed drum brake have been commissioned and tested for winding a single conveyance, unclutched operation should be solely for the purpose of changing levels and manriding should not be carried out in the unclutched condition.

Hours of employment of Winding Engineman

12.5 The hours of work of winding enginemen should not normally exceed 8 hours in any 24 hours. For the purpose of changing shifts, the hours of work per 24 hours period may be extended to not more than 16 on two such periods per week, but the average number of hours worked per 24 hour period by any winding engineman should not exceed 8 over any period of 3 weeks. In an emergency, a winding engineman may be employed beyond his normal hours of work.

12.6 Where one of the winding enginemen is absent due to illness or other cause, a winding engineman may be employed for up to a maximum of 12 hours on that day and thereafter on a system of 12 hour shifts with intervals of 12 hours between shifts for up to 6 weeks in any 12 week period.

12.7 The hours of work agreed should be posted by the manager in the winding engineroom and a record kept of the hours worked by each winding engineman.

Manager's rules

12.8 The manager's rules should lay down the procedures and duties to be followed for each winding installation to ensure safe winding and should, amongst other matters specify:-

(a) any person engaged in loading or unloading conveyances or waiting to travel through the shaft should follow the instructions of the banksman, onsetter or travelling onsetter as the case may be;

(b) the maximum winding speed of men, materials and minerals;

(c) that persons riding in a kibble should stand inside and not sit on the edge;

(d) the maximum load of minerals or materials which may ordinarily be carried;

(e) the precautions to be taken when carrying abnormal loads; (see para 12.9)

(f) the signals to be given (see para 12.10); and

(g) the operating procedures to be followed for different forms of winding (eg for manual winding 12.8-15, for automatic winding 12.17-20 and for pushbutton winding 12.21-26).

The manager should ensure that persons engaged in winding operations receive a copy of any part of the Rules relevant to their duties and should post notices at each entrance to the shaft showing the maximum load of persons or materials/minerals which may be carried and another notice in the winding engine house showing the maximum winding speed when men are being carried and the maximum winding speed for materials/minerals.

Transport of abnormal loads

12.9 The arrangements for transporting abnormal loads should include the supervision of the transport operation by a competent person, informing the winding engineman of the abnormality and any restrictions on winding speed and where necessary, counterbalancing the load.

Code of signals

12.10 The code of signals to be adopted at the mine should be specified. The manager should ensure that all persons who are required to use the code of signals are fully acquainted with it. A copy of the code should be posted at every entrance to a shaft and in every winding engine house.

12.11 At coal mines the following code of signals should be specified in manager's rules, and used both for man winding and mineral winding:

To raise up	1
To lower down	2
To raise steadily	4
To lower steadily	5
To stop when in motion	1

12.12 At mines other than coal mines, an alternative code of signals specified in manager's rules may be used. Because of differences in winding operations between individual mines there will be variations outside the main action signals and the manager should specify in writing any additional signals necessary; where there is more than one underground entrance in use these will include the signals to indicate to which entrance a conveyance is to be sent.

Carriage of persons

12.13 When men are to be carried through a shaft, signals to the winding engineman should be transmitted by the banksman and onsetter. The banksman or onsetter should not allow persons to enter the conveyance unless he has:-

(a) transmitted the signal 3 to the winding engineman and onsetter (or banksman as the case may be);

(b) received the signal 3 in return; and

(c) confirmed that the indicators show that the apparatus is operating in the manwinding mode and the brakes are fully engaged and locked in that position.

12.14 During manually controlled manwinding, except in the cases referred to in 12.16 and 15, the winding engineman should not set the apparatus in motion except on receipt from the onsetter of the signal to raise up (or to raise steadily) and from the banksman of the signal to lower down (or to lower steadily). The banksman should not transmit the signal to lower until he has received the signal to raise from the onsetter. (Where winding is to take place between insets the onsetter at the upper inset may be regarded as being the banksman).

12.15 Special provisions should be made for 'first man in' and 'last man out' manwinding.

Travelling onsetters

12.16 At installations with only one conveyance in use, the manager may appoint a travelling onsetter who travels in the conveyance, to give signals instead of a banksman and onsetter. In this case only one set of signals will be given to the winding engineman. Apparatus will need to be provided at all landings to ensure that the onsetter is able to operate the gates and to transmit signals safely from inside the stationary conveyance.

Automatic winding

12.17 Winding apparatus which is being operated automatically should not be used for manriding. A person trained as a winding engineman should be available at the mine at all times when the shaft is in use.

12.18 Winding apparatus should only be operated in the automatic mode when a competent person appointed by the manager is available at the mine. Only the competent person or a person appointed by the manager should switch the apparatus from manual to automatic control or vice versa or initiate an automatic sequence of winding.

12.19 During automatic operation the competent person may not need to be in the winding engineroom at all times to supervise operations provided that the equipment specified in para 8.40 is installed. However he should only leave the engineroom in accordance with the manager's rules which, amongst other matters, should specify that:-

(a) the competent person inspects the winding engine at appropriate intervals, taking into account the frequency of use, operating conditions etc;

(b) when a period of manwinding follows a period of automatic winding, the competent person manually operates the apparatus to complete one wind in each direction before manriding is allowed to take place;

(c) the operation of any alarm system provided to give warning of a malfunction of the winding apparatus is immediately communicated to the competent person wherever he is located and that he immediately investigates the cause of the alarm; and

(d) where in the course of automatic operation the conveyances stop anywhere except a place within 3 metres of the highest landing to which a conveyance is normally raised or any other landing or entrance to the shaft the competent person raises the conveyance, or supervises the raising of it, to the highest landing to which it is normally raised, at a speed not exceeding 2 metres per second.

12.20 When maintenance work has been carried out on the winding apparatus or ancillary apparatus including loading and unloading equipment, the winding engineman should operate the apparatus manually for one wind in each direction to ensure that it is functioning properly.

Push button winding

12.21 Push button operation of winding apparatus should only be carried out by competent persons (eg a banksman, onsetter or travelling onsetter) appointed in writing by the manager. A person trained as a winding engineman should be available at the mine at all times when the shaft is in use.

12.22 Only a person appointed by the manager should switch the apparatus from manual to push button operation (or vice versa). When the apparatus has been changed to push button control the competent person should complete one wind in each direction to check that it is in order before manwinding commences.

12.23 During push button winding the competent person may not need to be in the winding engineroom at all times to supervise the operation provided that the equipment specified in para 8.40 is installed. In this case the Manager's Rules should include the requirements specified in para 12.19; however the banksman should not leave the controls when he has cause to believe anyone is in a conveyance or when the apparatus is in motion except to close the main circuit breaker in an emergency.

12.24 When men are to be wound the banksman or onsetter should give the signal "3". He should not allow them to enter a conveyance unless he has received the signal "3" in return, and has observed that the indicators show that the apparatus is in the manwinding mode and the brakes are fully engaged and locked in the engaged position. The banksman should not set the apparatus in motion until the onsetter has signified that he is ready either by transmitting the "ready to wind" signal or by sending a signal "1 - to raise" - in the latter case the banksman should signal "2 - to lower" before setting the apparatus in motion.

12.25 Special provisions should be made for 'first man in' and 'last man out' manwinding.

12.26 If during push button winding the conveyances stop anywhere except at:-

(a) a place within 3 metres of the highest landing to which a conveyance is normally raised, or

(b) any other landing or entrance to the shaft,

the competent person should raise the conveyance, or supervise the raising of it, to the highest landing to which it is normally raised at a speed not exceeding 2 metres per second.

12.27 Where a travelling onsetter only is employed no signals are necessary. Effective means of controlling the winding apparatus should be provided in the conveyance and the control links to the winding apparatus should be secure and designed to fail to safety.

Lifts in mine shafts

12.28 During normal operations it is not necessary for a competent person to supervise the operation of the lift apparatus. The manager should appoint in writing persons to operate the lift and no one except an appointed person should set the lift in motion.

12.29 During normal operations the lift should be operated from controls inside the conveyance. If the lift has not been used for 8 hours or more, persons should not be allowed to travel in it until a competent person appointed by the manager has run the conveyance, using external controls, from the top of the shaft to the lowest entrance to check that the apparatus is in order.

SECTION 13 - COMMISSIONING OF WINDING APPARATUS

"REG 13.- (1) THE MANAGER SHALL APPOINT IN WRITING A SUFFICIENT NUMBER OF COMPETENT PERSONS WHO SHALL EXAMINE ALL ASPECTS OF THE INSTALLATION AND OPERATION OF ANY WINDING ENGINE AND ANCILLARY APPARATUS WHICH IS TO BE PUT INTO USE IN ANY SHAFT IN THE MINE.

(2) ANY PERSON APPOINTED PURSUANT TO PARAGRAPH (1) OF THIS REGULATION SHALL -

(a) IN THE COURSE OF MAKING ANY EXAMINATION PURSUANT TO THAT PARAGRAPH, ASCERTAIN, WHETHER THAT WINDING ENGINE AND ANCILLARY APPARATUS ARE LIKELY TO CAUSE DANGER TO ANY PERSON IN THE MINE.

(b) AFTER MAKING SUCH AN EXAMINATION MAKE A REPORT THEREOF.

(3) OTHER THAN FOR THE PURPOSES OF AN EXAMINATION MADE PURSUANT TO PARAGRAPH (1) OF THIS REGULATION, THE MANAGER SHALL NOT PERMIT ANY WINDING APPARATUS TO BE BROUGHT INTO USE IN THE MINE FOR THE FIRST TIME UNTIL HE IS SATISFIED THAT NO DANGER TO ANY PERSON IS LIKELY TO BE CAUSED BY SUCH BRINGING INTO USE".

S.6 Health & Safety at Work Act

13.1 The manager should ensure that the written report(1) of the inspection and test is satisfactory before he sanctions the use of the winding apparatus. Guidance on the training of winding engine testing engineers will be found in Part 1A para 136 of SMIM(2).

13.2 The procedures listed in Regulation 13 should be carried out not only where a new winding system is installed but also where a significant part of an existing system is replaced which may affect the performance of the winding system.

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(1) M&Q Form No 278

(2) Guidance on testing codes is given in Part 1B section 32 (for drum-winding systems) and Part 2B section 33 (for friction winding systems) of SMIM. See also Part 1A Paras 131-135 and 1B section 34 of SMIM.

SECTION 14 - MAINTENANCE AND TESTING OF WINDING APPARATUS

"REG 14.- (1) ALL WINDING APPARATUS AT A MINE, AND ALL EQUIPMENT ANCILLARY TO THE WINDING APPARATUS SHALL BE REGULARLY AND SYSTEMATICALLY INSPECTED, TESTED AND MAINTAINED IN ACCORDANCE WITH RULES MADE BY THE MANAGER FOR THE PURPOSE.

(2) THE MANAGER SHALL APPOINT IN WRITING A SUFFICIENT NUMBER OF COMPETENT PERSONS SO AS TO ENSURE THE REGULAR AND SYSTEMATIC INSPECTION, TESTING AND MAINTENANCE OF ALL WINDING APPARATUS AT THE MINE AND ALL EQUIPMENT ANCILLARY TO IT."

(3) AN INSPECTOR MAY, BY NOTICE SERVED ON THE MANAGER, REQUIRE THE MODIFICATION OF ANY RULE MADE PURSUANT TO PARAGRAPH (1) OF THIS REGULATION".

14.1 - Managers of mines subject to the Coal and Other Mines (Mechanics and Electricians) Regulations 1965 are already required to prepare a scheme of maintenance for all electrical and mechanical apparatus.

14.2 The rules made by the manager should amongst other matters, clearly set out the nature and periodicity of the inspections, examinations, tests or maintenance to be carried out on each piece of apparatus and the safety procedures to be adopted in carrying out such work.

14.3 The manager should draw up schedules detailing the inspections, examinations, tests or maintenance specific to individual items and ensure that they are kept up to date. The manager should consider the guidance contained in Part 1A paras 104, 107, 111, 118 and 126 and Part 2A para 188 of SMIM(1).

S.2 Health & Safety at Work Act

14.4 The manager should institute a formal system to ensure that maintenance is carried out.

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(1) See also Part 1A paras 100-103, 105, 106, 108-110, 112-117 and 119-125, Part 1B sections 29-31 Part 2A paras 181-187 and 189-205 and Part 2B sections 15-29 of SMIM.

14.5 Any person carrying out tests, maintenance, inspections or examinations should, at or before the end of his shift, make a written report of the work carried out, any defects found and remedial action taken. Where a defect is found likely to affect safe working immediate remedial action must be taken.

Routine external inspection of winding engines and ancillary apparatus

14.6 The rules of maintenance should provide for all external parts of winding apparatus used for carrying persons to be thoroughly inspected at least once in every 24 hours in which the apparatus is in use to ascertain its condition and security. Where apparatus is not in regular use, such as emergency winding apparatus, these inspections may be carried out at longer intervals not exceeding 3 months but it should be inspected immediately before it is brought into use and thereafter at the frequency previously referred to.

14.7 The rules should provide for all apparatus used for attaching a conveyance to the rope to be thoroughly examined and a report(1) made at least every 6 months or immediately after an overwind has caused the detaching gear of drum winding systems to operate or the conveyance arresting devices of friction winding systems to be engaged. Unless it is made of material which renders it unnecessary or impractical(2), all suspension gear except that listed in Appendix 4 should be subjected to appropriate heat treatment at least every 6 months.

14.8 Detaching gear on drum winding systems should be dismantled, cleaned and refitted at intervals not exceeding 3 months. Whenever a detaching hook is replaced by another, checks should be made to ensure that the dimensions of the replacement hook are compatible with those of the detaching plate or bell.

Maintenance of winding ropes

14.9 Winding ropes should be inspected externally at least once in every 24 hours in which they are in use. In addition, thorough examinations should be made at intervals not exceeding 30 days in the course of which a rope should be cleaned at all places particularly liable to deterioration and at other places not more than 90 metres apart throughout its length. After cleaning the surface condition of the rope should be examined, the diameter measured and a check made for any fractures of the wires. A report of the inspection or examination should be made forthwith(1). Dead laps and spare laps of rope in or on the drum need not be subject to the thirty day examination.

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(1) on M&Q Form No 279

(2) these materials are listed in Appendix 1.

14.10 Correct capping of winding ropes is essential and provision should be made for them to be re-capped at regular intervals when they are in use. The appropriate intervals for different types of winding system are specified below:

(a) friction and fixed drum winding ropes - should be re-capped at intervals not exceeding 6 months;

(b) emergency mobile winding ropes - should be recapped at intervals not exceeding 12 months except when their aggregate or continuous duty reaches six months in any twelve month period, in which case they should be re-capped immediately; and

(c) lift installations in mine shafts - should be re-capped at intervals not exceeding five years.

14.11 Recapping of winding ropes should be carried out by or under the supervision of a competent person appointed by the manager. Before any rope is recapped a length of rope including the capping should be cut off and opened up immediately for internal inspection and a report made of its condition(2). The length of rope which should be cut off will vary with the period which has elapsed since the last recapping but in the case of drum winders should not be less than the following:

(a) if the rope was recapped within the previous 3 months - 1 metre;

(b) if the rope was recapped within the previous 4 months - 1.2 metres;

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(1) on M&Q Form 277

(2) on M&Q Form 281

(c) if the rope was recapped within the previous 5 months - 1.5 metres; or

(d) if the rope was recapped longer than 5 months previously 2 metres.

The physical condition of the wire in the length cut off should be determined by carrying out tensile, bend and torsion tests for comparison with the previous samples and the rope when new. In the case of friction winding or lift systems the capping should be moved a distance of not less than 150 mm along the rope.

White metal cappings

14.12 Only white metal with a melting point of 300°C or less should be used as part of any white metal rope capping(1), and it must not be re-used for this purpose. When pouring the metal in the capel the person in charge of the operation should ensure that:

(a) the temperature of the white metal does not exceed 365°C; and

(b) the temperature of the socket of the capel is between 100°C and 205°C before the white metal is poured in.

Testing of winding engine brakes and automatic contrivances

14.13 Provision should be made for brakes and automatic contrivances to be regularly tested to ensure they are effective. Brakes should be tested at least once every shift to ensure their performance has not been affected by contamination of brake linings or damage and this should preferably be undertaken before winding starts. Automatic contrivances should be tested at least once a week by raising the conveyance above the point at which the contrivance comes into operation at the top of the shaft. At suitable intervals it should be tested by attempting to land the descending conveyance at an excessive speed. These tests should be carried out at least every 6 months for electrically driven winding systems fitted with a supervisory device in addition to an automatic contrivance but other types should be tested at least every 3 months. Managers should consider the guidance given in the model testing codes for drum and friction winding systems(1). The speed control system of lift installations should be tested at intervals not exceeding 6 months and other control and supervisory systems at intervals not exceeding 12 months. A report of the result of these tests should be made(2).

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(1) White metal for cappings should comply with BS 643:1970.

Over inspection

14.14 The manager/owner should make arrangements for the winding engine maintenance to be verified by a competent person other than a member of the mine engineering staff at intervals not exceeding 3 years, to check that specified maintenance procedures are being properly carried out and recorded.

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(1) See Part 1B section 32 (drum winding systems) and Part 2B section 32 (friction winding systems) of SMIM.

(2) on M & Q Form 278

GUIDANCE NOTE ON TYPES OF STEEL TO BE USED FOR CONVEYANCE SUSPENSION GEAR (PARAGRAPH 10.7)

1. The following types of steel should be used for making any apparatus (including a detaching hook) provided for attaching a conveyance to a rope.

(A) Steels to BS 2772: Part 2: 1977

2. Blooms, billets, slabs, flat bars, bars, forgings

Steel of the types having the chemical composition specified for 1.5 per cent Manganese Steel, 150M12; 1.5 per cent Manganese Steel (higher tensile), 150M19; Nickel Chromium Molybdenum Steel, 806M20; and Nickel Chromium Molybdenum Steels (higher tensile), 806M22 and 826M31 in the British Standard Specification 2772: Part 2: 1977 and having the mechanical properties specified in the appropriate tables in that specification.

Plates

3. Steel plate of the type having the chemical composition specified for 1.5 per cent Manganese Steel 150M12 in the British Standard Specification 2772: Part 2: 1977 and having mechanical properties specified in Table 1 below.

TABLE 1

Property	Plate Hardened and Tempered Limited Ruling Section(1)	
	100 mm	>100 mm
Tensile Strength (N/mm^2)	490	By arrangement
Yield Stress (N/mm^2)	320	
Elongation on $5.65\sqrt{S_o}$(2) per cent	24	
Charpy Impact Value Joules - 10°C	65	

(1) S_o is the original cross-sectional area of the gauge length of the test piece - see BS 18: Part 2: 1971

(2) For the meaning of the term "Limiting Ruling Section" reference should be made to BS 2772: Part 2: 1977

4. Alternatively, where steel plate of this material cannot be obtained from the steel supplier with guaranteed mechanical properties for the hardened and tempered condition, the plate may be ordered to the chemical composition specified above, and with mechanical properties for the normalised condition conforming with those given in Table 2 below.

TABLE 2

Property	Plate Normalised Limiting Ruling Section(1)	
	150 mm	> 150 mm
Tensile Strength (N/mm^2)	430	By arrangement
Yield Stress (N/mm^2)	265	
Elongation on $5.65 \sqrt{S_o}$(2) per cent	26	
Charpy Impact Value Joules - 10°C	60	

5. The following conditions should be complied with when this steel plate is supplied in the normalised condition:

(i) the apparatus made from this steel plate should be subjected during manufacture to a hardening and tempering process;

(ii) notwithstanding the normalising heat treatment given to the test pieces used for the determination of the mechanical properties, a test block should be provided from each cast of steel plates and should be hardened and tempered, either separately or with a batch of manufactured apparatus, and its mechanical properties determined to ensure that they conform to the requirements for steel in the hardened and tempered condition.

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(1) For the meaning of the term "Limiting Ruling Section" reference should be made to the British Standard Specification referred to - BS 2772: Part 2: 1977

(2) S_o is the original cross-sectional area of the gauge length of the test piece - see BS 18: Part 2: 1971

6. Steel plate of the type having the chemical composition specified for 806M20 in the British Standard Specification 2772: Part 2: 1977, namely. Apparatus manufactured from this steel plate should be heat treated in accordance with British Standard Specification 2772: Part 2: 1977 for 806M20 steel. For limiting ruling sections of 150mm or less, the heat treatment process should result in the following minimum levels of mechanical properties being attained:

Tensile strength	620 N/mm^2
0.2%Proof Stress	435 N/mm^2
Elongation $5.65\sqrt{S_o}$	Gauge Length 17%
Charpy V - notch (-10°C)	45 Joules

The location and orientation of test specimens should be as contained in British Standard Specification 2772: Part 2: 1977 for 806M20 steel.

(B) Steels to BS 2772: Part 2: 1956

7. Suspension gear made from steel of the type having the chemical composition specified for "1.5% Manganese Steel" in the British Standard Specification 2772: Part 2: 1956 and having the mechanical properties specified in Table 4 of that specification or, if the ruling section(1) specified in that table is exceeded , the properties specified in the following table may continue to be used for their definitive life as specified in paragraph 10.7 of the code of practice.

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(1) Note: For the meaning of the terms "Ruling Section" and "Limiting Ruling Section" reference should be made to the British Standard Specification referred to in paragraph 2 of this Appendix.

Property	Bars, billets and forgings		
	Normalised or Normalised and Tempered	Hardened and Tempered	
	Limiting ruling section		
	Over 6"	Over 6"	Over 4" - 6"
Tensile strength tons/sq in., min.	28	28	31
Yield stress tons/sq.in., min.	17	18	20
Elongation on $4\sqrt{S_o}$(1) per cent, min.	30	25	27
Izod impact value ft. lb., min.	45	40	45

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(1) S_o is the original cross-sectional area of the guage lengths of the test piece - see BS 18: Part 2: 1971.

APPENDIX 2

FORMULA TO DETERMINE THE MAXIMUM RETARDATION WHICH SHOULD NOT CAUSE SLIP IN A FRICTION WINDER (para 8.6)

$$r = \frac{e^{\mu\theta} \quad T_a - T_d}{e^{\mu\theta} \quad (T_a + G_a) + (T_d + G_d)} \times g$$

Where r is the retardation in metres per second^2 resulting from the greatest torque which would not cause any winding rope to slip.

e is the Naperian base taken as 2.7183

μ is the coefficient of friction between the winding ropes on the winding sheave = 0.2

θ is the angle of lap in Radians of the winding ropes on the winding sheave.

T_a is the static tension in tonnes force in the ascending winding ropes at the level of the winding sheave.

T_d is the static tension in tonnes force in the descending winding ropes at the level of the winding sheave.

G_a is the sum of the following:

(i) the equivalent mass in tonnes force of the deflecting sheaves associated with the ascending winding ropes, referred to the winding rope centre line,

(ii) the mass in tonnes force of the ascending winding ropes in the rope plane between the winding sheave and the deflecting sheaves where the friction winding apparatus is of the ground mounted type,

(iii) the mass in tonnes force of the vertical ascending winding ropes in the headgear between the deflecting sheaves and a point level with the winding sheave, where the friction winding apparatus is of the ground mounted type.

G_d is the sum of the following:

(i) the equivalent mass in tonnes force of the deflecting sheaves associated with the descending winding ropes, referred to the winding rope centre line,

(ii) the mass in tonnes force of the descending winding ropes in the rope plane between the winding sheave and the deflecting sheaves where the friction winding apparatus is of the ground mounted type,

(iii) the mass in tonnes force of the vertical descending winding ropes in the headgear between the deflecting sheaves and a point level with the winding sheave where the friction winding apparatus is of the ground mounted type.

g is the acceleration due to gravity, ie 9.81m/sec^2

FORMULAE FOR CALCULATION OF SAFETY FACTORS OF WINDING ROPES (para 10.3)

$$F_1 = 1.0 + \frac{4.5\ (R+C)}{R(1 + 0.0051\ \sqrt{M}) - 13.5}$$

$$F_2 = \frac{4.5\ (R+C)}{R(1 + 0.0051\ \sqrt{M}) - 13.5}$$

Where

R = the ratio of the diameter of the winding sheave to the diameter of the winding ropes;

C = 35 where there is not a nearby deflecting sheave, or 43 where there is a nearby deflecting sheave; and

M = the vertical distance in metres between the level of the top of the highest winding sheave and the level at which the winding ropes meet the suspension gear of the conveyance when at its lowest position in the shaft.

APPENDIX 4

COMPONENTS OF CONVEYANCE SUSPENSION GEAR WHICH DO NOT REQUIRE PERIODIC HEAT TREATMENT (para 14.7)

(a) Wedges and safety blocks of wedge type capels

(b) Fine adjustment blocks of multi-rope suspension gear
Outer plates, drop pin and bottom pins of Barker Davies 2 and 2A detaching hooks.
Outer plates, spacer blocks and rivets and the drop pin of the Barker Davies 4 catch detaching hook.

GLOSSARY - GUIDANCE NOTE ON TERMS USED IN THE REGULATIONS AND CODE OF PRACTICE

Abnormal Load

Any load of a greater mass than the maximum normally permitted for the system or any load which by virtue of it's dimensions requires special handling.

Ancillary Apparatus

See winding engine, winding apparatus and winding system.

Arresting Devices

Devices provided in the headgear and the sump to arrest an overwound conveyance or counterweight, particularly in friction winding systems.

Automatic Contrivance

The apparatus provided to prevent overwinding or overspeed of a manriding conveyance or counterweight and which is designed:

(a) to prevent the descending conveyance from being landed at the lowest entrance or at the bottom of the shaft at an excessive speed; and

(b) to control movement of the ascending conveyance to prevent danger to persons therein; and

(c) to control the speed of the conveyance or counterweight and prevent travel beyond predetermined end of wind limits.

Automatic Shaft Signalling Systems

A signalling system in which the transmission of signals is initiated by completion of the loading and unloading process.

Automatic Winding System

The operation of a winding engine between predetermined levels in a shaft which is initiated by starting switches interlocked with and thereafter controlled and operated by the loading and unloading equipment.

Backshaft Winding Engines

Backshaft Winding Engines are defined as simple systems operating at 4m per second or less, used only once or twice each shift or less frequently and carrying small loads as with shaft pumping duties and shaft inspections.

Balance Rope

A rope suspended from and linking the underside of the conveyances, or conveyance and counterweight, to reduce the effect of the out-of-balance weight in the shaft.

Banksman

The man in charge of signalling and of loading and unloading conveyances at the shaft top.

Brake Locking Device

A locking mechanism on the mechanical brake of a winding engine which is engaged when that brake is fully applied and prevents the brake from being released, or a dump valve which when operated exhausts fluid pressure to cause the brake to be applied and prevents it from being released.

Bumping Beams

In friction winding, beams fitted in the headgear and the shaft sump, at the limits of travel, to stop an overwound conveyance or counterweight.

Capping/Capel

The complete attachment fitted at the end of a rope, by means of which the rope is coupled to any suspension gear or conveyance or counterweight.

Clutched Drum Winding Engine

A winding engine having two drums either or both of which may be de-clutched for the purpose of adjusting the depth of winding.

Competent Person

A person who by virtue of his training and experience and in some cases, age or qualifications, is deemed to be competent to perform a specific task or duty.

Conveyance

Any carriage, cage, skip or kibble (but not a counterweight) in which persons, mineral or materials are wound through a shaft.

Conveyance Safety Gear

Automatic safety gear fitted to a lift car which in the event of the failure of the winding ropes or suspension gear or if the lift car exceeds a predetermined downward speed will stop and hold the car when carrying the maximum load.

Counterweight

A frame containing weights connected into a single conveyance winding system to reduce the out-of-balance static loads within the system.

Crash Doors

Doors fitted at the top of a shaft sinking which are capable of preventing a fully loaded conveyance from falling back down the shaft.

Creep Speed

A low winding speed normally employed just prior to stopping or for rope or shaft examination.

Detaching Bell or Plate

The apparatus in the headgear which operates the detaching hook in the event of an overwind, and from which the detached conveyance or counterweight is thereafter suspended.

Detaching Hook

A device in drumwinding installations located between the capping and the conveyance or counterweight so that, in the event of a severe overwind, an ascending drum wound conveyance or counterweight is detached from the rope and is suspended from the detaching bell or plate.

Drum Winding System

A winding system in which the rope for a conveyance or counterweight is fastened at one end to the drum of a winding engine so that it is wound on or off as the drum is rotated.

Dynamic Braking

A means of obtaining controlled electrical braking by utilising an AC winding engine as a generator by replacing AC power to its stator with a DC excitation and using the rotor resistance controller to control the braking and dissipate the energy.

Electrical Braking

The use of electrical energy in a winding engine motor for the purpose of decelerating the winding system.

Emergency Trip

The automatic opening of the safety circuit resulting in the application of the brakes following the detection of an abnormal condition.

Examination

A visual examination by a competent person carried out carefully and critically and supplemented by other means (such as measurement and where necessary non-destructive testing) in order to arrive at a reliable conclusion as to the condition and safety of the equipment or installation which if necessary should be dismantled.

External Parts of Winding Apparatus

Those parts which can be visually examined without dismantling.

Factor of Safety

The ratio between the ultimate tensile strength of a component and the maximum static load to which it may be subjected.

Fail To Safety

The automatic assumption of a safe condition in the event of a fault or failure of a component or system.

First Man In

The first man to be wound to an unmanned landing.

Friction Winding System

A winding installation in which a rope or ropes are attached to a conveyance or counterweight at each end and in which movement of the conveyance or counterweight is produced by friction between the rope or ropes and the treads of a driven drum or sheave of a winding engine.

Governor Rope

A steel wire rope provided in a lift installation to drive a governor which monitors the speed of the lift car and operates the safety gear in the event of a downward overspeed.

Guides

An arrangement of girders, rails, timbers, or ropes, in a shaft to restrict lateral movement of conveyances or counterweights.

Headgear

The structure at the top of a shaft on which the winding pulleys or sheaves are mounted.

Inching control

A push button which operates the winding engine at low speed only while it is being pressed.

Infinite Fatigue Life

A component is said to be designed for infinite fatigue life when the calculated stress conditions are such that failure from fatigue of the component under specified service conditions should theoretically never occur i.e. the number of duty cycles that can be withstood may be regarded as infinite.

Inset

An underground opening or entry from a shaft.

Inspection

A visual inspection by a competent person looking carefully and critically for anything which may impair the safe and efficient working of the equipment or installation.

Keps

Retractable supports in a shaft on which a conveyance may rest.

Kibble

A large steel bucket used to transport men, materials or debris in a shaft sinking or deepening.

Landing

Any shaft entrance normally used by men to enter or leave a conveyance.

Last Man Out

The last man to be wound from a landing, leaving it unmanned.

Lift Installation

A conveyance and counterweight system running on rigid guides suspended by multiple steel ropes, driven by friction on electrically powered metal pulley and capable of being controlled from within the conveyance by push button.

Manual Winding

Winding in which the functions of the winding apparatus (eg acceleration, deceleration and braking) are manually controlled and initiated by the winding engineman.

Maximum Static Torque

The torque resulting from the maximum static load in the conveyance during men, materials or mineral winding.

Maximum Torque

The torque resulting from the maximum power permitted by the torque limiting device to be applied by the prime mover. Where no torque limiting device is provided, the maximum torque shall be taken as 1.1 times the maximum torque required in service for normal duties taking into account any permissible variation in loading conditions.

Mechanical brake

Members which transmit force from springs, fluid or a weight(s) to braking surfaces of a drum or sheave of a winding engine, to bring the drum or sheave to rest and to hold the drum or sheave at rest by action of brake friction linings on brake paths.

Onsetter

The man in charge of signalling and of loading and unloading conveyances at a shaft inset.

Overspeed Device

A device which detects when a conveyance is travelling at excessive speed and causes the winding apparatus to be brought to rest.

Overwind

Unintentional overtravel of a conveyance or counterweight beyond the normal limits of winding.

Overwind Safety Catches

Catches or equivalent devices provided in headframes to prevent conveyances from falling back an excessive distance after a severe overwind, independent of the suspension gear.

Practical

Non-legal term used occasionally in the Code to indicate that the HSE is aware that, although the method outlined in the Code is in general desirable, it may not be practical in all circumstances. No precise assessment of the costs and benefits is required.

Push Button Winding

Winding in which each wind is initiated manually from the shaft side or within a conveyance and in which the wind is completed without further manual intervention.

Rider

A framework for steadying a kibble between two guide ropes in a shaft sinking or deepening.

Safety Circuit

A circuit which detects abnormal conditions and causes the winding engine to be brought to rest, prevents its being moved and in some cases indicates the nature of the abnormal condition.

Scaffold Winch

A powered winch on which the ropes supporting a sinking scaffold are wound.

Sinking scaffold/Sinking Stage

A working platform suspended in a shaft sinking.

Shaft (see also Regulation 2(1))

A vertical or steeply inclined excavation, of limited width in relation to its depth, made to provide access to underground workings and including the extension thereof above ground to the detaching bell or plate or the bumping beam. A winze, staple shaft or vertical bunker in the course of being sunk shall be considered a shaft.

Shaft Furnishings

Pipes, cables and their supports within a shaft including the supporting structure for rigid guides.

Shaft Lining

A brick, concrete or metal lining installed for the purpose of supporting the strata at the sides of a shaft sinking.

Shaft Sinking/Sinking Shaft

A shaft in the process of being excavated.

Shaftsman

A person employed in the inspection, maintenance and repair of shafts.

Shaft Sump

The extension of the shaft below the lowest inset.

Signal

Audible and visual intimation conveyed over a distance to a code, used to control the movement of winding apparatus.

Single Line Component

A critical component the failure of which to function as designed renders a system totally inoperative.

Skip

A shaft conveyance designed primarily for the bulk handling of minerals.

Slip

Abnormal relative movement between the winding rope(s) and friction treads of a friction winding engine.

Staple Shaft

A shaft connecting excavations at two or more levels below ground and having no surface outlet.

Supervisory Device

A digital monitoring device provided to shadow the automatic contrivance and provide a back up for the main protective features.

Suspension Gear

Apparatus including any detaching hook for attaching to the winding rope a conveyance or counterweight.

Tipping Chute

A retractable chute for conveying debris from a kibble tipped at the top of a sinking shaft to a storage hopper or stockpile.

Travelling Onsetter

A person travelling in a conveyance who is in charge of signalling and loading and unloading in place of banksman and onsetter in some single conveyance systems during manwinding.

Tubbing

A shaft lining consisting of a series of segments designed to be water tight.

Ultimate limit switch/Ultimate overwind switch

A switch positioned in a headframe above the highest terminal decking level, and operated by a conveyance in the event of an overwind beyond the point at which the overwind switches on the automatic contrivance are operated.

Walling

A brick or concrete shaft lining.

Winding engines, winding apparatus and winding systems

The winding engine and all ancillary apparatus make up the complete winding apparatus for winding persons, materials or minerals through shafts. The winding apparatus and its system of use make up the winding system concerned.

Winding Engineman

A person competent to operate the winding engine during manual winding.

Winding Rope

A steel wire rope used for suspending and moving conveyances in a shaft utilising a winding engine.

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